UNIVERSITY OF WESTERN MACEDONIA

SCHOOL OF ENGINEERING

DEPARTMENT OF INFORMATICS AND TELECOMMUNICATIONS ENGINEERING

STUDY GUIDE

2014 – 2015

Kozani, September 2014

University of Western Macedonia
Department of Informatics and Telecommunications Engineering
Karamanli & Lygeris
50100, Kozani
Greece
Tel.: +30 24610 56500, +30 24610 56503, +30 24610 56504
fax: +30 24610 56501
email: icte@uowm.gr
url: www.icte.uowm.gr

Editing: Theodoros Zygiridis (Assistant Professor)
Translated by: Dr Sofia Christidou (PhD in Traslatology)

HEAD OF THE DEPARTMENT'S WELCOME

Dear Students

The Study Guide you currently have (or reading on your screen) presents the Undergraduate Program of the Department of Informatics and Telecommunications Engineering, of the University of Western Macedonia (DITE-UOWM).

The Study Guide has been designed to introduce you to the organization of the Department, to present useful information, specifically to provide you with an outline of the curriculum through a presentation of each course offered. In addition, this guide will introduce you to the academic organization and administrative structure of the University, the Department and the School of Engineering, of which the Department of Informatics and Telecommunications Engineering is part of. At the same time, you will obtain information regarding the current teaching Staff, the ancillary and the administrative staff, the location of the University as well as the teaching and laboratory facilities of the Department. You will also be provided with information on student issues, organization studies, internship , information on each semester and each course content, learning objectives and indicative bibliography.

This program is similar to Curricula in respective Departments in Greece and abroad and has developed to its present form through a series of improvements and updates over the last 10 years, i.e. throughout the existence of the Department.

DITE is not just another typical IT Department. It is a Department of Informatics and Telecommunications Engineering, in which the two pillars of the subject of Electronic Engineering are treated equally. The Information Technology and Telecommunications disciplines are evolving rapidly, as students will be trained in up-to-date techniques and evolving areas such as the analysis of signals and data, internet, computer systems, processing, transmission and coding information, electronic arrangements, mobile and satellite communications, automation systems, etc. Many of the main courses of the first semester are offered together (co-teaching) with the Department of Mechanical Engineering, following the modern practices of teaching common core courses to Schools / Departments of Engineering. Beyond the typical educational process, the Department also offers Internship opportunities, aiming to establish a link with the local industry and business community as well as international exchanges through IAESTE and ERASMUS + programs.

DITE has adequate infrastructure, fine laboratories and during this period a significant investment is being placed in further development of laboratory and research infrastructure through the NSRF (National Strategic Reference Framework) program. The Professors of the

Department are characterized by their young age, strong communication skills and intense research activity.

Finally, it should be noted that through a Presidential Decree the professional rights of Electronic Engineering have been established for graduates of the Department from the Technical Chamber of Greece.

Dear students, you are entering a dynamic academic environment with many future career possibilities. With this warm welcome, I would like to encourage you to grab the opportunity offered to you by entering a University Department, to develop your knowledge, learn to think and operate as engineers, as scientists/rationalists who support their views, studies and decisions with strong scientific (mathematical and physical)research. Convert your studying time to a creative period. I wish you wholeheartedly to taste the joy that we all get by acquiring knowledge and by the ability to use it for both our own benefit as well as for the benefit of the society.

Theodoros Theodoulidis
Professor, Head of DITE

UNIVERSITY OF WESTERN MACEDONIA

SCHOOL OF ENGINEERING (Kozani)

Department of Mechanical Engineering (www.mech.uowm.gr)

Dept. of Informatics & Telecommunications Engineering (www.icte.uowm.gr)

SCHOOL OF EDUCATION (Florina)

Department of Primary Education (www.eled.uowm.gr)

Department of Preschool Education (www.nured.uowm.gr)

SCHOOL OF FINE ARTS (Florina)

School of Visual and Applied Arts (www.eetf.uowm.gr)

UNIVERSITY ADMINISTRATION

CHAIRMAN OF THE GOVERNING BOARD

Chatzipantelis Theodoros	*Professor, Dept. of Political Sciences, Aristotle University of Thessaloniki*

VICE-CHAIRMAN

Patias Petros	*Professor, Dept. of Rural and Surveying Engineering, Aristotle University of Thessaloniki*

MEMBERS

Margaritis Konstantinos	*Professor, University of Macedonia*
Vlachopoulos Elias	*Physicist*
Tressou - Fatourou Evangelia	*Professor, Dept. of Primary Education, Aristotle University of Thessaloniki*
Andreou Andreas	*Professor, Dept. of Primary Education, University of Western Macedonia*
Kikkinidis Eustathios	*Professor, Dept. of Mechanical Engineering, University of Western Macedonia*
Komninos Nikolaos	*Professor, Dept. of Architecture, Aristotle University of Thessaloniki*
Zervos Arthuros	*President of Public Power Corporation,*

Professor, School of Mechanical Engineering,
National Technical University of Greece

GENERAL INFORMATION

The Department of Informatics and Telecommunications Engineering was founded in 2005 and is located in the city of Kozani (Government Gazette Issue A` 192/2005). In the academic year 2005 - 2006 the department opened its doors to the first students and also began its operation. In the academic year 2014-2015 the number of newly arrived students stands at 153, while the total number of enrolled students rises up to 528.

To fulfill the instructional requirements, the Department has at its disposal 9 Professors and Lecturers, 2 members of Laboratory Teaching Staff (ACC), Professors from other university departments and a number of temporary teachers. Head of the Department is Professor Theodoros Theodoulidis. In the past in the same capacity have served the Professors Christos Massalas, Ioannis Dimitropoulos, Ioannis Manolopoulos, Konstantinos Margaritis, Theodoros Chatzipantelis and Nicholaos Fahantidis.

DEPARTMENT STAFF

PROFESSORS/LECTURERS OF THE DEPARTMENT

ASSOCIATE PROFESSORS

Aggelidis Pantelis

- Diploma, Department of Electrical & Computer Engineering, Aritotle University of Thessaloniki (1989).
- PhD, Department of Electrical & Computer Engineering, Aritotle University of Thessaloniki (1993).
- Expertise: ***Bioinformatics - Biomedical Signal Processing*.**
- email: paggelidis@uowm.gr

Louta Malamati

- Diploma, School of Electrical & Computer Engineering, National Technical University of Athens, (1997).
- PhD, School of Electrical & Computer Engineering, National Technical University of Athens (2000).
- MSc, " Techno-economic systems ", National Technical University of Athens, University of Athens, (2004).
- Expertise: ***Networks Design and Support of Advanced Telecomunicationm Services*.**
- email: louta@uowm.gr

Stergiou Konstantinos

- Diploma, Computer Engineering and Informatics Department, University of Patras (1995).
- MSc, Department of Computer Science UMIST, UK (1997).
- PhD, Department of Computer and Information Science, University of Strathclyde, UK (2001).
- Expertise: ***Intelligent Systems*.**
- email: kstergiou@uowm.gr

ASSISTANT PROFESSORS

Verykoukis Christos

- BSc, Physics Department, Aristotle University of Thessaloniki, 1994.
- MSc, Physics Department, Aristotle University of Thessaloniki, 1997.
- PhD, Signal Theory and Communications Department of the Technical University of Catalonia (UPC), Barcelona (2000).
- Expertise: ***Wireless Telecommunications.***
- email: cveri@cttc.es

Zygiridis Theodoros

- Diploma, Department of Electrical & Computer Engineering, Aristotle University of Thessaloniki (2000)
- PhD, Department of Electrical & Computer Engineering, Aristotle University of Thessaloniki (2006).
- Expertise: ***Applied Mathematics and Computational Methods for Engineers*.**
- email: tzygiridis@uowm.gr

LECTURERS

Dasygenis Minas

- Diploma, Department of Electrical & Computer Engineering, Democritus University of Thrace (1999).
- PhD, Department of Electrical & Computer Engineering, Democritus University of Thrace (2005).
- Expertise: ***Computer System Architecture*.**
- email: mdasygenis@uowm.gr

Bibi Stamatia

- BSc, Department of Informatics, Aristotle University of Thessaloniki (2002).
- PhD, Department of Informatics, Aristotle University of Thessaloniki (2008).
- Expertise: ***Software Engineering.***
- email: sbibi@uowm.gr

Sarigiannidis Panagiotis

- BSc, Department of Informatics, Aristotle University of Thessaloniki (2001).
- PhD, Department of Informatics, Aristotle University of Thessaloniki (2007).
- Expertise: ***Telecommunication Networks.***
- email: psarigiannidis@uowm.gr

Tsalikakis Dimitrios

- BSc, Department of Mathematics, University of Ioannina (2001).
- PhD, Medical School, University of Ioannina (2006).
- Expertise: ***Modeling and Analysis ofEelectrophysiological Data.***
- email: dtsalikakis@uowm.gr

TEACHING STAFF OF OTHER DEPARTMENTS

Theodoulidis Theodoros (theodoul@uowm.gr)	*Professor, Dept. of Mechanical Engineering*
Bakouros Ioannis (ylb@uowm.gr)	*Associate Professor, Dept. of Mechanical Engineering*

Skodras Georgios (gskodras@uowm.gr)	*Associate Professor, Dept. of Mechanical Engineering*
Souliotis Emmanouel (msouliotis@uowm.gr)	*Associate Professor, Dept. of Mechanical Engineering*
Nenes Georgios (gnenes@uowm.gr)	*Assistant Professor, Dept. of Mechanical Engineering*
Fahantidis Nikolaos (nfaxanti@uowm.gr)	*Assistant Professor, Dept of Educational and Social Studies, University of Macedonia*
Panagiotidou Sofia (span@uowm.gr)	*Lecturer, Dept. of Mechanical Engineering*
Sotiropoulou Rafaela (rsotiropoulou@uowm.gr)	*Lecturer, Dept. of Mechanical Engineering*

LABORATORY TEACHING STAFF

Bellou Sofia (sbellou@uowm.gr)

Psoma Sotiria (psoma@uowm.gr)

SPECIAL TECHNICAL LABORATORY STAFF

Galfas Nikolaos (ngalfas@uowm.gr)

ADMINISTRATION OFFICE

Vavliara Despoina (Dept. Secretary, dvavliara@uowm.gr)

LIBRARY

Trigoni Theodora (dtrigoni@uowm.gr)

THE DEPARTMENT

The Department of Informatics and Telecommunications Engineering is located in Kozani (70.420 inhabitants), capital of Kozani Prefecture and seat of the UOWM. This constitutes the second polytechnic department of UOWM. In the same city is also located the Department of Mechanical Engineering (at approximately 1 km), and the administrative services of the UOWM at a distance of 1,5 km). Three more departments of the university are based in Florina.

The activities of the Department are handled in premises at the eastern entrance of Kozani, just 2 km from the city center. In addition, faculty offices and a laboratory room are located in a building which houses laboratories of the department of Mechanical Engineering. Public transport to and from the city is available at a close vicinity to the main building.

(A) The main building of the Department, (B) Utility Building of the Department, (C) Administration Building of UOWM.

The Department of Informatics and Telecommunications Engineering was founded according to Government Gazette Issue A' 192/2-8-2005 and started operating for the first time in the academic year 2005-2006.The first graduates of this department were sworn-in at the end of the academic year 2010-2011.

The professional patent of graduate engineers of the Department was made in accordance with the Presidential Decree 58/2009, while by decision of the Technical Chamber of Greece (TCG-TEE) / Dep. Western Macedonia, the graduates are enrolled in the specialty of Electronic Engineering of TCG-TEE.

GENERAL ISSUES CONCERNING UNDERGRADUATE STUDIES

The duration of studies at the Department lasts five years and is divided into ten semesters, which are differentiated into fall and spring semesters. Each student selects the courses that he will attend and will be examined in at the beginning of each semester, on dates which are announced by the Administration/Course Office. During the 10th semester a compulsory dissertation is drafted.

For the freshmen of the academic year 2014-2015, a total of 56 courses are required to obtain a degree, as well as writing a dissertation. All classes are equally important in calculating the final score of the degree. The mark of the dissertation is considered to be equivalent to the grade of 6 additional courses.

The academic year begins on 1st September of each year and ends on 31st of next August. The teaching prerequisite of each academic year is divided into two semesters. Each semester consists of at least 13 full weeks of teaching and three weeks of examinations. The first semester begins in late September and the second closes at the end of June. If the minimum number of teaching weeks is not completed in a course, then this course is not considered to be taught and it cannot be examined. In case of examining a non-taught course, the test is invalid and its grade is not considered in the final score of the degree. By decision of the Executive Committee, following a proposal by the General Assembly of the Department, an extension of the semester could be authorized up to a maximum of two weeks, in order that the required minimum number of teaching weeks is completed.

The courses, except for the examination periods, are interrupted from Christmas Eve until the day of Epiphany, on Ash Monday or Monday of Lent and from Megali Deytera-Good Monday (The last Monday before Easter) until Low Sunday. No classes are held or exams take place during weekends and the following holidays and national days:

October, the 11th	The Liberation of Kozani
October, the 28th	The National Day of “OXI” (NO)
November, the 17th	The National Day of “Polytechnio” (Engineering School)
December, the 6th	Ag.Nikolaos-St. Nicholas Day - patron saint of Kozani
January, the 30th	Three Hierarchs Holiday
March, the 25th	The National Day of the 1821 Revolution
May, the 1st	1st May/Labor Day
	Holy Spirit Day – Mobile Religion Holiday

In addition, classes are not held on the day of student elections.

Examinations are conducted exclusively after the fall and the spring semester for courses taught during these semesters, respectively. The student has the right to be examined in the courses of both semesters before the start of the fall semester. Each student is entitled to participate in examinations only of those courses which he has determined with the courses statement he lodged at the beginning of the semester.

The exam score of the students in each course is determined by the professor, who organizes it according to his best judgment written and/or oral examinations or relies on projects or laboratory exercises. In case of failure in a compulsory course, the student is obliged to repeat it in the following semesters.

The selection and receiving process of textbooks is performed through the "Eudoxus" Program (www.eudoxus.gr). Students have the right of choice and of the free supply of one textbook for each course taught. Overall, students are allowed to select and receive a number of free textbooks which is equal to the total number of compulsory and elective courses necessary for obtaining the degree. If students choose more elective courses than what is required for obtaining the degree, the right of choice and of the free supply of textbooks does not extend to the extra courses they have chosen and are tested, even when these courses are considered in obtaining their degree.

After the completion of the regular study period, which equals to the minimum semester number necessary for the acquirement of the Academic Title, according to the indicative curriculum of the Department, increased by four semesters, students may enroll in the semesters, only if they comply with the attendance continuance conditions laid down by the Foundation`s Organization.

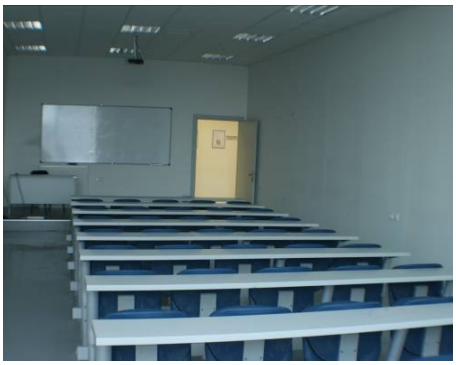
If the student does not enroll in the Department for two consecutive semesters, he `s automatically deleted by the Department.

Students have the right to interrupt their studies, upon written request at the Administration Office of the Department, for as many semesters, consecutive or not, as they wish to, and certainly for no more than the minimum number of semesters required to receive a degree according to the indicative curriculum. These semesters are not calculated in the above maximum duration of Studies. Students who interrupt their studies as above, do not maintain the student membership throughout the period of interruption of their studies. At the end of the interruption of their studies, the students can return to the Department.

INFRASTRUCTURE

The Department of Informatics and Telecommunications Engineering is housed in a building of 2000 sq.m. located at the eastern entrance of the city of Kozani, at K. Karamanlis & Ligeri St. In the building you can access :

- the Administration/Course Office of the Department,
- an amphitheater of 178 seats,
- three large and two smaller classrooms,
- three fully equipped Computer Laboratories,
- an Electronics Laboratory,
- a Telecommunications Laboratory,
- a Digital System and Computer Architecture Laboratory,
- an Electronic Health and Biomedicine Technology Laboratory,
- a Robotics Laboratory,
- a Networks Laboratory,
- a Library with a reading area,
- member offices for Professors, Laboratory Teaching Staff and Specialized Technical Laboratory Staff.



Computer Laboratories

The Department possesses three Computer Laboratories, which consist of 25 work stations equipped with PC`s, a projector and a laser printer to assist the courses and the students. The Computer Laboratories operate with Virtual Machines (VM). There are some VM running with Microsoft Windows operating system and some with Linux operating systems (Ubuntu, Fedora, FreeBSD). An indicative list of applications available in the Computer Laboratories is:

SPSS	Java ME SDK	Hypersim
Matlab	Netbeans	Modelsim
Adobe Suite	Dev-C++	Ns2
Microsoft Office	Prolog	ArgoUML
Microsoft Visual Studio	Android SDK	Opnet
Microsoft SQL Server	ARM IDE	Xilinx
XAMP	Multisim	Xsniffer
Java SDK	Logisim	WEKA

Telecommunications Laboratory

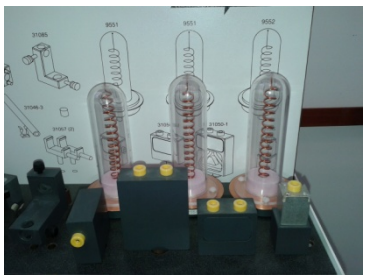
The Telecommunications Laboratory supports the educational activities in the following courses:

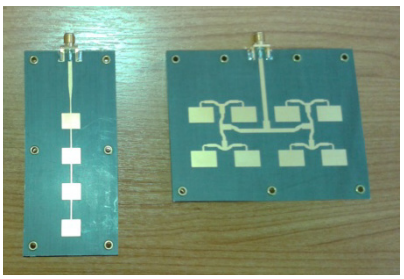
- Communications Systems I (5th semester)
- Communications Systems II (6th semester)
- Antennas and Wireless Propagation (7th semester).
- Microwave Communications (9th semester).

Specifically, the Telecommunications Laboratory equipment includes the following:

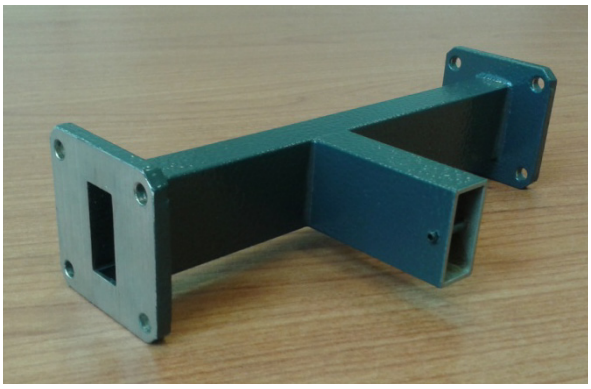
- Telecommunications Training System (25 work stations) for experimental training of students on the fundamental principles of analog and digital communications. Specifically, for each work station, the Telecommunications Training System consists of a preprinted circuits base which provides a computer connection, in which removable exercise boards are installed for the training of students of the Department on the Analog and Digital Communications.

- Educational Antennas System (10 work stations), providing practical experimentation on different types of antennas (e.g. horn type, helix type, flat, Yagi) at 1 GHz and 10 GHz frequencies.





- Microwave Communications Educational Systems (3 work spots).

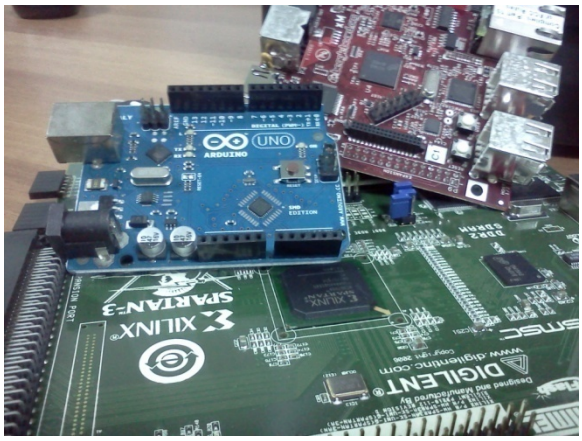


- Spectrum analyzers, oscilloscopes and generators of random waveforms.
- Selective radiation meter Narda SRM-3006, for measurements within the frequency range 27 MHz – 3 GHz.
- Network analyzer Keysight E5063A for testing passive components, such as antennas, cables, filters, PCBs, within the frequency range 100 KHz – 4.5 GHz.

Digital Systems and Computer Architecture Laboratory

The Digital Systems and Computer Architecture Laboratory meets the research and training needs in both core courses and in specialization courses of the Department. The Laboratory includes:

- 30 work stations with Intel I5 / 2GB Ram computer stations,
- 3 development inventors kit with Arduino microprocessor,
- 9 reconfigurable logic boards FPGA Xilinx Spartan 3A,
- 2 development kit devkit8000 with TI OMAP3530 (600MHz ARM Cortex-A8) processor, with a touch screen,
- 2 beagleboard development kit with ARM Cortex-A8 processor with DSP support, 4 mobile android units,
- 2 sets of lego mindstorm.



Also, under the management of the Laboratory are:

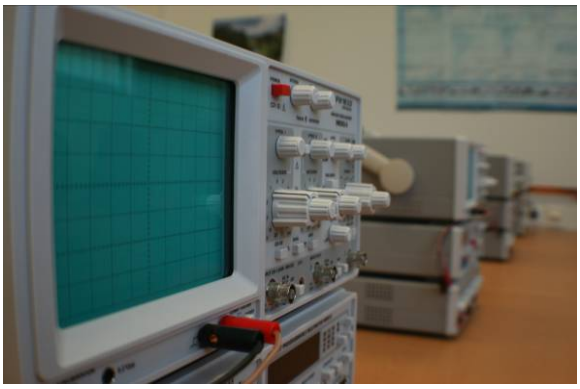
- an array of two computers with 4 parallel processing Nvidia Geforce 9800GTX graphics cards,
- a parallel system with 16 Xeon E5520@2.27GHz 76GB RAM processors,
- 4 servers with dual core Intel (R) Xeon (TM) CPU 3.40GHz / 8GB RAM processors. The computer operating systems are FreeBSD 9.0, Ubuntu 12 LTS, Microsoft Windows 7.

The Laboratory equipment is used for the courses

- Operating Systems
- Computer Architecture,
- Embedded Systems,
- Parallel and Distributed Systems,
- Microprocessors,
- Advanced Digital Design Issues.

Laboratory equipment is also used for the dissertations of students in related subjects, as well as the research needs of the Department in matters related to software and hardware co-design, integrated systems-on-a-chip (SoC) and multi-core systems.
(website of the laboratory : http://arch.icte.uowm.gr).

Electronics Laboratory



The Electronics Laboratory includes 20 work stations which are specially equipped with oscilloscopes, low and high frequency generators, AC and DC power supplies and multimeters.

The software packages used in the laboratory for analyzing and designing electronic circuits are the MultiSim and the ADS (Advanced Design Systems). The Electronics Laboratory is mainly used for the preparation of laboratory exercises for the Electronics I and Electronics II courses as well as for the research activities of the Department.

Laboratory of Electronic Health and Biomedical Technology

The Laboratory of Electronic Health and Biomedical Technology supports the courses "Biomedical Technology", "Electronic Health" and "Bioinformatics". In particular, it allows the training of students in the following:

Recording and analyzing of basic biosignals

- Recording and analysis of Electrocardiography with a wireless cardiograph.
- Measurement of arterial blood pressure with wireless sphygmomanometer.
- Measurement of lung function: Spirometry with wireless spirometer.
- Measurement of blood oxygenation with wireless oximeter.
- Take of cardiotocographic signal.

Digital Processing of Biological Signals

Methods and signal processing techniques derived from biological systems, signals and systems, design and implementation of digital filters, applications.
Use of fluorescence microscope for taking and processing biological sample images.

Introduction to Medical Imaging Systems

Management and editing images from computed tomography (CT Scan), Magnetic Resonance Imaging (MRI), endoscopy systems, ultrasound scanner. Reconstruction Methods of Medical Image: Image reconstruction algorithms (single backprojection, filtered backprojection, iterative reconstruction algorithms), defects in the reconstructed images, three-dimensional tomography.

Online health care

Provision and demand of online medical information, medical interventions through the Internet (such as tele-therapy) and peer support networks (p2p) in virtual medical

communities. The online use of search methods and the use of the internet to support clinical trials. Health Portals. Telemedicine services and applications. Mobile and Wireless Communications in Health Care.

Laboratory of Networks and Advanced Services

The Laboratory of Networks and Advanced Services (LNAS) supports the educational work and the conduct of applied and basic research in the areas of communications networks, computer networks and advanced telecommunications services. Specifically, the Laboratory activities include the design, evaluation, performance analysis, optimization and network management, control resources and network management in wired and wireless networks, information security, analysis and evaluation of new technologies and protocols, dynamic restructuring networks, design and support of advanced services, adaptation of services and applications over heterogeneous network infrastructures, network energy consumption management and telematics applications.

LNAS supports the educational needs of the courses "Telecommunication Networks", "Computer Networks I", "Computer Networks II", "Mobile Networks", "New Generation Networks and Services", "Computer and Network Security", "Design, Operation and Management Networks" and "Optical Communications and Networks."

It possesses five work stations that provide access to modern network devices in switching and routing level. Additionally, it is possible to implement, support and configure wireless point-to-point links, unstructured wireless networks and optical interconnections. The Laboratory also provides a set of servers that offer modern services, including safe switching and routing services, digital telephony, virtual networking, implementation of digital telephone centers and cloud computing services.

In detail, the Laboratory of Networks and Advanced Services provides the following equipment:

- Two Cisco routers (2921 series).
- One Cisco router (2901 series).
- Three Cisco switches (series 2960S).
- Two Cisco switches (series 2960X).

- One Cisco switch (800 series).
- Two MikroTik switches (series CCR1009).
- Four MikroTik switches (series CRS125).
- Six access points 802.11n (various types).
- Two pairs of antennas to create a wireless link.
- Three servers (telephony, security center, visual interface).
- Simulation software of wireless local area (WLAN) networks, radio coverage and spectrum analysis of wireless local area networks simulation, including the 802.11n protocol.
- Application analysis software.
- Set of optical technology laboratory equipment.

Robotics Laboratory

The lab posseses up-to-date equipment for the educational and research activities of the Department in the area of Robotics, such as:

- Articulated arm of industrial type.
- Educational configurations for the construction and programming of robotic units.
- Humanoid robots.
- Robots for social assistance applications.
- Robotic platforms of mobile type, for interior applications (e.g. in warehouses), capable of wireless networking, supervision, etc

USEFUL INFORMATION

❖ Internship

The Internship of students of the department started in the academic year 2010-2011 with funding from the Operational Program for Education and Initial Vocational Training (O.P. "Education") which is launched by the Ministry of Education and with the cooperation of various companies. Throughout the Internship, the supervisor on behalf of the company and the responsible LTS member are monitoring the progress of the students and evaluate their performance. During and after the end of the Internship, the student is required to submit reports on the work done in accordance with the rules contained in the Regulation of the University. Participation and successful completion of the obligations of the students referred to the work of the Internship is equivalent to successful completion of one elective course of the Curriculum. Responsible for the Internship of the Department is the Associate Professor K. Stergiou.

❖ Intensive Erasmus Program

The Department's students may attend an intensive Erasmus program in a specialized field of IT or Telecommunications, if such a program is offered during each academic year. Participation and successful completion of an intensive Erasmus program is equivalent to successful completion of one elective course of the Curriculum.

GENERAL DESCRIPTION

Awarded academic title

On successful completion of their studies, students acquire

Diploma in Informatics and Telecommunications Engineering

Admission requirements

Students are admitted to the Department through:

- Panelladikes Admission exams
- Qualifying exams

Educational and professional goals

According to the Article 1 of Presidential Decree 130/2005, the Informatics and Telecommunications Engineering department aims at fostering and promoting education, scientific research and knowledge on the basic subject matters of computer engineering and telecommunications and its mission is:

a) To foster and promote knowledge on the main fields of information technology and telecommunications technology and networks.

b) To provide expertise knowledge in modern sectors of information technology and telecommunications, such as data analysis, internet, signal and image analysis, software engineering, mobile and satellite communications etc.

c) To provide students with the necessary skills that ensure their best training for an academic and professional career, especially in IT and telecommunications companies as well as the public sector.

Professional status

According to the Presidential Decree 44/2009, the Informatics and Telecommunications Engineers have, based on general and specialized scientific knowledge acquired during their studies, the ability to engage in activities that cover, depending on their area of expertise, the following areas:

Study, design, analysis, manufacturing, construction and operation supervision, evaluation, maintenance, expertise conduct and certification of standards in compliance with their installation and with all kinds of applications in the following scientific fields

a) computing,

b) telecommunications and telecommunication systems and networks,

c) information technology and information systems and

d) automation systems, signal processing, image and audio processing, speech processing, graphics, etc.

Moreover, , in accordance with the applicable provisions, the graduate Engineers of the Department may engage in indicative projects, according to the content of their studies such as

a) teaching in Universities and Technological Educational Institutions, in secondary education, in technical and vocational training, both in the public and private sector, in the theoretical, technological and applied field of scientific areas of IT and telecommunications as listed above.

b) research in public and private research centers in the scientific areas listed above in the theoretical, technological and applied field.

c) supply of services to integrated Departments concerning informatics, networks, computerization and technical services in ministries, public institutions, offices and companies, in electronic communications companies, in banking, insurance, medical sector, in the media, in audiovisual production and processing companies, in transport, shipping, tourism, in business consulting firms and high technology companies.

Department graduates are registered, after examinations, in the Technical Chamber of Greece and are included in the specialty of "Electronic Engineering". In addition, graduates may engage as teaching staff in Secondary Education occupying specialty posts "UE 19"(University Education).

Access to further studies

The Department's graduates gain access to further postgraduate studies (second cycle), as well as in studies for a doctorate (third cycle).

COURSE CHART OF STUDY PROGRAMME WITH CREDITS (60 PER YEAR)

1st SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
MK1	Mathematical Analysis I	4	5
MK2	Linear Algebra	3	4
MK3	Electromagnetism	4	5
MK4	Introduction to Structured Programming	5	5
MK5	Introduction to Information Technology	4	4
MK6	Introduction to Telecommunications	4	5
MK7	English I	2	2

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
7	26	30

2nd SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
MK8	Mathematical Analysis II	4	5
MK9	Digital Design	4	5
MK10	Object Oriented Programming I	4	5
MK11	Telecommunication Networks	4	5
MK12	Discrete Mathematics	4	4
MK13	Technology and Innovation, Introduction to Economics	3	4
MK14	English II	2	2

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
7	25	30

3rd SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
MK15	Applied Mathematics I	4	5
MK16	Probability Theory and Statistics	5	5
MK17	Algorithms and Data Structures	4	5
MK18	Electric Circuits	5	5
MK19	Computer Networks I	4	5
MK20	Computer Architecture	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	26	30

4th SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
MK21	Applied Mathematics II	4	5
MK22	Operating Systems	4	5
MK23	Signal and System Theory	4	5
MK24	Computer Networks II	4	5
MK25	Electronics I	4	5
MK26	Mathematical Modeling and Numerical Analysis	5	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	25	30

5th SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
MK27	Electromagnetic Waves	4	5
MK28	Digital Signal Processing	4	5
MK29	Communication Systems I	4	5
MK30	Electronics II	4	5
MK31	Object-Oriented Programming II	4	5
MK32	Operations Research	5	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	25	30

6th SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
MK33	Software Engineering	4	5
MK34	Parallel and Distributed Systems	4	5
MK35	Web Programming	4	5
MK36	Communication Systems II	4	5
MK37	Algorithm Analysis and Design	4	5
MK38	Databases	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	24	30

7th SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
Y1	Artificial Intelligence	4	5
Y2	Analysis and Simulation of Communication Networks	4	5
Y3	Antenna Systems and Wireless Propagation	4	5
Y4	Automatic Control Systems	4	5
E	Elective Course	4	5
E	Elective Course	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	24	30

8th SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
Y5	Mobile Communication Networks	4	5
Y6	Optical Communications and Networks	4	5
Y7	Human-Computer Interaction	4	5
Y11	Computer and Network Security	4	5
E	Elective Course	4	5
E	Elective Course	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	24	30

9th SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
Y8	Microwave Communications	4	5
Y9	Bioinformatics	4	5
E	Elective Course	4	5
E	Elective Course	4	5
E	Elective Course	4	5
E	Elective Course	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	24	30

10th SEMESTER

The 10th semester is devoted to the diploma thesis, which can be underatken after completing the first 8 semesters, provided that the number of courses the students has not passed does not is lower than 9 (this does not include the cources of the 9th semester). The preparation of the diploma thesis is conducted under the supervision of a Department's Professor and is equivalent to 30 ECTS credits.

ELECTIVE COURCES, WINTER SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
E33	Embedded Systems	4	5
E2	e-Health	4	5
E3	Next Generation Networks and Services	4	5
E4	Robotics	4	5
E5	Microtechnology and Nanotechnology	4	5
E6	Quality Control	4	5
E7	Technology, Research, Innovation Policies and Entrepreneurship	4	5
E8	Engineering and feasibility study	4	5
E9	Queuing Theory	4	5
E10	Complexity Theory	4	5
E11	Data Mining	4	5
E22	Microprocessors	4	5
E23	Advanced Digital Design Techniques	4	5
E24	Mobile Computing	4	5
E25	Electric Power Systems	4	5
E26	Thermodynamics	5	5
E27	Special Assignment	-	5
E12	Internship	-	5

ELECTIVE COURCES, SPRING SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
E13	Modeling and Optimization of Supply Chains	4	5
E14	Wireless Sensor Networks	4	5
E15	Biomedical Technology	4	5
E17	Digital Image Processing	4	5
E18	New & Renewable Energy Sources	4	5
E19	Industrial Management	5	5
E20	Simulation and System Dynamics	4	5
E28	Network Design, Operation, and Management	4	5
E29	Compilers	4	5
E30	VLSI Design	4	5
E31	Electric Machnies	4	5
E32	Electromechanical Applications	4	5
E12	Internship	-	5

Final exams

Examinations are conducted exclusively after winter and spring semester for the courses taught in these semesters, respectively. Each student is entitled to be examined for the lessons of both semesters before the start of the following winter semester. The rating for each course is determined by the corresponding instructor, who can organize – at his discretion – written or oral examinations, or to rely on projects or laboratory exercises.

Exam regulations and evaluation/scoring

The student's grade performance is calculated based on a ten-scale grades:

- Excellent : 8,50-10,00.
- Very good: 6,50- 8,49.
- Good: 5,00-6,49.
- Fail: 0,00-4,99

The minimum passing mark is 5.

Official duration of the programme

Studies in the Department of Informatics and Telecommunications Engineering are full-time and five-year long, and the workload corresponds to 300 ECTS credits. 60 ECTS credits correspond to a full academic year, and 30 ECTS credits correspond to each full academic semester. A certain number of ECTS units (greater or equal to 2) is assigned to each course, which is pertinent to the required workload. The ECTS credits represent the workload required from students for successful completion of each course (the workload is representative of the estimated time typically required by a student, in order to complete all learning activities required to achieve the expected learning results).

Department's ECTS coordinator

Malamati Louta.

COURCES (AGGREGATE DATA)

The following table shows the the category and the number of cources which are required from the students enrolled in academic year 2014-2015, in order to obtain the diploma

Course Categories	Number of Courses
Core Cources	**38**
Compulsory Courses, 7th-9th Semester	**10**
Elective Cources, 7th -9th Semester	**8**
TOTAL	**56**

The following table presents the categories and the pertinent number of courses offered by the Department

Course Code	Course Categories	Number of Cources
ΜΚ	Core Cources	**38**
Υ	Compulsory Courses, 7th-9th Semester	**10**
ΕΠ	Elective Cources, 7th -9th Semester	**29**
TOTAL		**77**

COURSE DESCRIPTIONS

1st SEMESTER

Course title	**Mathematical Analysis I**
Course code	MK1
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	1st
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE108/
Hours per week	4 (lectures: 2 hours, exercises: 2 hours)
Instructor(s)	Theodoros Zygiridis (Assistant Professor)
Course content	Sets. Real numbers. Sequences of real numbers. Series of real numbers. Real functions of a single variable. Limits and continuity. Derivatives. Application of derivatives. Indefinite and definite integrals, improper integrals. Applications of integration. Power series.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to examine the convergence of real sequences, series, as well as power series, • to calculate infinite sums, • to study real functions of one variable, • to differentiate parametrically-defined and implicit functions, • to determine lines tangent to plane curves that are described in different ways, • to calculate indefinite, definite, and improper integrals, • to use polar coordinates, • to calculate the area between curves, and the length of plane curves, • to approximate functions with polynomials.
Prerequisites	None
Teaching methods	Lectures, exercises
Assessment methods	Written intermediate exam (25%), written final exam (75%).

Language of instruction	Greek
Recommended bibliography	[1] R. L. Finney, M. D. Weir, F. R. Giordano, *Απειροστικός Λογισμός*, Πανεπιστημιακές Εκδόσεις Κρήτης, 2012. [2] F. Ayres, *Διαφορικός και Ολοκληρωτικός Λογισμός*, Κλειδάριθμος, 2008. [3] Θ. Ρασσιάς, *Μαθηματική ανάλυση Ι*, ΣΥΜΕΩΝ, 2011. [4] Brand, Louis *Μαθηματική ανάλυση*, Εκδόσεις Ι. Συμεών , 1984 [5] Ghorpade, Sudhir R.Limaye, Balmohan V., *A Course in Calculus and Real Analysis* [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. [6] H. Anton, I. Bivens, S. Davis, *Calculus – Early Transcendentals* (9th ed), John Wiley & Sons, 2009.

Course title	**Linear Algebra**
Course code	MK2
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	1st
ECTS Credits	4
URL	eclass.uowm.gr/courses/ICTE211/
Hours per week	3
Instructor(s)	Konstantinos Balassas (Adjunct Lecturer)
Course content	Vector Calculus. Straight Lines, Surfaces and Curves in Space. Vector Spaces and Vector Subspaces. Linear independence, Bases and dimension of vector Spaces. Matrices and Determinants. Finite-dimensional linear mappings. Matrices of linear maps. Systems of Linear Equations and Matrices. Solution of Systems of Linear Equations. Eigenvalues-Eigenvectors. Matrix Diagonalization. Quadratic Forms.

Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to know and manage the general form of curves and surfaces, • to understand and use concepts of vector spaces, • to use matrices as tools in theoretical and numerical computations, • to compute eigenvalues and eigenvectors, • to compute determinants, • to solve systems of linear equations, • to manage and use matrix diagonalization.
Prerequisites	None
Teaching methods	Lectures, exercises
Assessment methods	Written final exam (100%)
Language of instruction	Greek
Recommended bibliography	[1] G. Strang, Γραμμική Άλγεβρα και Εφαρμογές, Πανεπιστημιακές Εκδόσεις Κρήτης, 2009. [2] Α. Κυριαζής, Εφαρμοσμένη Γραμμική Άλγεβρα, Νικητόπουλος Ε & Σια ΟΕ, 2006. [3] G. Strang, Introduction to Linear Algebra, Wellesley-Cambridge Press, 2003. [4] Τζουβάρας Θεόδωρος, Γραμμική Άλγεβρα Ι (και ΙΙ), Σαββάλας 2001. [5] Κουτελιέρης, Σιάννη, Γραμμική Άλγεβρα για Μηχανικούς, Τζιόλας 2005. [6] Serge, Land, Linear Algebra, Springer Verlag Berlin and Heidelberg GmbH & Co. KG, 1993. [7] Richard C., Penney, Linear Algebra, John Wiley and Sons Ltd, 1998.

Course title	**Electromagnetism**
Course code	ΜΚ3
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	1st

ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE247/
Hours per week	4 (Theory: 2 hours, Exercises: 2 hours)
Instructor(s)	Manolis Souliotis (Associate Professor)
Course content	Electric charge and Electric Field, Electric Potential, Electric Currents, DC Circuits, Magnetism, Electromagnetic Induction and Faraday's Law, Electromagnetic Waves.
Expected learning outcomes and competences to be acquired	The course presents systematically basic knowledge of Electromagnetism. After the completion of the course the students should be able to handle and solve simple and / or complicated problems related to Electrics and Magnetism.
Prerequisites	None
Teaching methods	Hours of Instruction: 52
Assessment methods	Final written exam (compulsory) , Intermediate written exam (optional)
Language of instruction	Greek
Recommended bibliography	[1] Physics, Volume B, HALLIDAY-RESNICK [2] Physics, Volume B, Young Hugh D.

Course title	**Introduction to Structured Programming**
Course code	MK4
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	1st
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE110/
Hours per week	5
Instructor(s)	Kostas Stergiou (Associate Professor)

Course content	Introductory concepts. Programming Languages. Algorithms. Algorithm Execution and Compilers. Programming Methodology. Design and Evaluation. Introduction to the C Programming Language. Data Types, Constants and Variables. Parameters, Parameter Passing, Commands, Functions. Arrays, Pointers, Strings, Structures. Dynamic Data Structures. Recursive Functions. File Processing.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will: • know how to design simple algorithms • understand the basics of structured programming • know how to write, compile, and debug programs in C • be able to write programs in C using loops, arrays, functions, pointers, structures, and files • have basic knowledge of software engineering
Prerequisites	None
Teaching methods	Lectures, lab work
Assessment methods	Written final exams (70%), Lab (30%)
Language of instruction	Greek
Recommended bibliography	[1] Νίκος Χατζηγιαννάκης, *Η γλώσσα C σε βάθος*, Κλειδάριθμος, 2009 [2] Kernighan, Ritchie, Η ΓΛΩΣΣΑ ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΥ C, Κλειδάριθμος, 2008 [3] Σεφερίδης, C για Αρχάριους, Κλειδάριθμος, 2009

Course title	**Introduction to Information Technology**
Course code	MK5
Course type	Compulsory
Course level	Undergraduate
Year of studies	1st
Semester	1st
ECTS Credits	4
URL	http://eclass.uowm.gr/courses/ICTE164/
Hours per week	4
Instructor(s)	Nikos Fahantidis (Assistant Professor)

Course content	**Theory Content:** Computer Hardware and Architecture, Operating Systems, Numeral Systems, Operations in Binary System, Basic Digital Logic, Flip-Flop, logic circuits. Examples of Components Implementation with logic gates. Introduction to Databases, SQL Language, HTML and Networking (wired, wireless). **Laboratory Content:** Familiarization with computer hardware, learning Windows Operating System, introduction to MS OFFICE suite (Microsoft Word, MS PowerPoint, MS Excel, MS Access). Programming in assembly using a program simulator environment for Window (Relatively Simple CPU Simulator). Introduction to web design and HTML.
Expected learning outcomes and competences to be acquired	Understanding of current scientific and professional status (state of the art) in the areas of the Department. Basic tools necessary for successful completion of specialized courses of higher semesters and completion of studies.
Prerequisites	None
Teaching methods	2 hr teaching and 2 hr laboratory exercises
Assessment methods	50% final exam 25% lab exam 25% semester projects
Language of instruction	Greek
Recommended bibliography	[1] Ross Malaga, Εισαγωγή στην Τεχνολογία Πληροφοριακών Συστημάτων, Γκιούρδας [2] Andrew LISTER, Εισαγωγή στη Σύγχρονη Επιστήμη των Υπολογιστών, Δίαυλος, 2000. [3] Beekman George, Quinn Michael J., Εισαγωγή στην Πληροφορική, Χ. ΓΚΙΟΥΡΔΑ & ΣΙΑ ΕΕ, 2010

Course title	**Introduction to Telecommunications**
Course code	MK6
Course type	Compulsory
Course level	Undergraduate (first cycle)

Year of studies	1st
Semester	1st
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE172/
Hours per week	4
Instructor(s)	Eirini Karapistoli (Adjunct Lecturer)
Course content	History of Telecommunications. Telecommunications Systems Model. Information Transmission Techniques. Bandwidth & Spectrum. Channel Capacity. Synchronous & Asynchronous Transmission. Modulation and Coding. Transmission Media. Multiplexing. Noise. Error Detection and Management. Retransmission Techniques. Introduction to Telecommunication Networks. Network Classification. Network Design and Layered Architecture. OSI Reference Model. General principles on network management.
Expected learning outcomes and competences to be acquired	The course objective is the comprehension and learning of the basic principles of communications, data networking and communication protocols. Specifically, the telecommunication systems model and the layered protocol architecture are presented in detail (OSI reference model, TCP/IP protocol stack). Emphasis is given on the first two layers (Physical, Data Link).
Prerequisites	None
Teaching methods	The course is taught via lectures, while students actively participate. The lectures are supported with presentations in power point, which are available to the students via the asynchronous tele-education platform. Exercises are solved.
Assessment methods	Course assessment is conducted by written exams taking place at the middle and the end of the semester, including questions (both open and multiple choice) as well as exercises that cover the course content (30% and 70%, respectively).
Language of instruction	Greek
Recommended bibliography	[1] William Stallings, "Επικοινωνίες Υπολογιστών και Δεδομένων", 8η Έκδοση, 2011, Εκδόσεις Τζιόλα. [2] Α. Αλεξόπουλος και Γ. Λαγογιάννης, "Τηλεπικοινωνίες και Δίκτυα Υπολογιστών", 8η Έκδοση, 2012, Εκδόσεις Παπασωτηρίου.

Course title	**English I**
Course code	MK7
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	1st
ECTS Credits	2
URL	eclass.uowm.gr/courses/ICTE231
Hours per week	2
Instructor(s)	Sophia Christidou (Adjunct Lecturer)
Course content	Introduction to the scientific terminology of computer and telecommunications engineering. Comprehension and writing of scientific texts. Enhancement of oral skills. Content: hardware and software of computer systems, programming languages, networks and theoretical foundations of computer science.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to understand and assimilate information and technical terms from English-speaking sources relevant to their field of study, to exercise constructive criticism on the above, • to assess the peculiarity and writing methods of technical-scientific texts, • to redact technical-scientific texts, • to orally express their opinions and to make oral presentations on technical issues particularly with the use of tools such as PowerPoint, openoffice etc • to redact their documents and presentations making proper use of bibliographic sources (e.g. text or presentation structures, references in the text and in the bibliography).
Prerequisites	None
Teaching methods	Lectures
Assessment methods	Assignments – group projects (30%), final exam (70%)
Language of	English

instruction

Recommended bibliography	[1] Κουτσογιάννη Ευαγγελία, *English for Electronics and Telecommunications*, Έκδοση: 2/2009, ΣΥΓΧΡΟΝΗ ΕΚΔΟΤΙΚΗ ΕΠΕ.

2nd SEMESTER

Course title	**Mathematical Analysis II**
Course code	MK8
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	2nd
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE136/
Hours per week	4 (lectures: h hours, exercises: 2 hours)
Instructor(s)	Theodoros Zygiridis (Assistant Professor)
Course content	The $\mathbb{R}^n$ space. Quadratic surfaces. Real functions of several variables. Partial derivatives. Chain differentiation. Directional derivative. Extreme values. Taylor series. Double integrals. Triple integrals. Vector functions. Curves. Line integrals. Differentiation of scalar and vector fields. Conservative fields. Green's theorem. Surface integrals. Gauss και Stokes theorems.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to differentiate variables of several functions, • to use cylindrical and spherical coordinates, • to find extreme values (free/constraint) and saddle points, • to linearize functions and find tangent planes, • to perform double and triple integration, • to manipulate vectors, • to differentiate vector functions, • to detect irrotational and solenoidal fields, • to determine potentials for conservative fields, • to parametrically describe curves and surfaces, • to calculate line integrals and fluxes through surfaces of vector fields, • to use Green's, Gauss, και Stokes theorems.
Prerequisites	Elements of the following course are required: • Mathematical Analysis I
Teaching methods	Lectures, exercises

Assessment methods	Written intermediate exam (25%), written final exam (75%)
Language of instruction	Greek
Recommended bibliography	[1] R. L. Finney, M. D. Weir, F. R. Giordano, *Απειροστικός Λογισμός*, Πανεπιστημιακές Εκδόσεις Κρήτης, 2012. [2] F. Ayres, *Διαφορικός και Ολοκληρωτικός Λογισμός*, Κλειδάριθμος, 2008. [3] Θ. Ρασσιάς, *Μαθηματική ανάλυση Ι*, ΣΥΜΕΩΝ, 2011. [4] Brand, Louis *Μαθηματική ανάλυση*, Εκδόσεις Ι. Συμεών , 1984 [5] Ghorpade, Sudhir R.Limaye, Balmohan V., *A Course in Calculus and Real Analysis* [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. [6] H. Anton, I. Bivens, S. Davis, *Calculus – Early Transcendentals* (9th ed), John Wiley & Sons, 2009.

Course title	**Digital Design**
Course code	MK9
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	2nd
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE235/
Hours per week	4 (2 hours theory, 2 hours lab)
Instructor(s)	Sotiris Kontogiannis (Adjunct Lecturer)
Course content	The purpose of this course is to provide to the students a detailed knowledge of the basic hardware elements of computer systems. Specifically, starting from the basic concepts of binary logic and logic circuits, students shall learn to use the building blocks of digital systems, as well as design and analyze both combinational and sequential digital circuits. In depth, digital design course deals with the following: • Binary numbers and arithmetic • Logic gates and standards symbolism

	• Basic concepts of logic circuits • Boole Algebra, logic functions and simplification methods, digital circuits synthesis and analysis • Combinational circuits • Binary Adder, half adder, full adder, parallel adder and subtractor circuits • Comparator , Decoder - Encoder circuits • Demultiplexer , Multiplexer circuits • Programmable logical arrays • Analysis and design of synchronous/asynchronous sequential circuits • Introduction to VHDL • Exercises
Expected learning outcomes and competences to be acquired	Upon successful completion of the digital design course, students shall attain familiarity with a broad range of digital circuits. That is, combinational and sequential digital circuits and computer systems' integrated circuits and shall thoroughly understand the principles and disciplines for robust digital logic and digital systems' design.
Prerequisites	None
Teaching methods	Lectures, Practical exercises, Laboratory exercises
Assessment methods	Written exam (100%)
Language of instruction	Greek
Recommended bibliography	[1] Βιβλίο [22701978]: Ψηφιακή Σχεδίαση, Ρουμελιώτης Μάνος, Σουραβλάς Στάυρος Ψηφιακή Σχεδίαση Κωδικός Βιβλίου στον Εύδοξο: 22701978 Έκδοση: 1η Έκδοση/2012 Συγγραφείς: Ρουμελιώτης Μάνος, Σουραβλάς Στάυρος ISBN: 978-960-418-388-3 Τύπος: Σύγγραμμα Διαθέτης (Εκδότης): ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε. [2] Βιβλίο [41963432]: Ψηφιακή Σχεδίαση, Morris Mano, Michael Ciletti Κωδικός Βιβλίου στον Εύδοξο: 41963432 Έκδοση: 5η Έκδοση/2013 Συγγραφείς: Morris Mano, Michael Ciletti ISBN: 978-960-491-084-7 Τύπος: Σύγγραμμα Διαθέτης (Εκδότης): ΠΑΠΑΣΩΤΗΡΙΟΥ Α.Ε.

Course title	**Object Oriented Programming I**
Course code	MK10
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	2nd
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE233/
Hours per week	4
Instructor(s)	Nikos Dimokas (Adjunct Lecturer)
Course content	Basic principles and concepts of object-oriented programming in C++. Abstract and concrete classes, interfaces. Properties and objects. Inheritance. Polymorphism. Encapsulation. Composition and aggregation. Methods, messages, method overloading and overriding. Program control constructs. Arrays and dynamic structures. Templates. Exception handling.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to: • understand and use the basic principles of object oriented programming • understand, design and implement classes and objects • understand and use the concept of inheritance • understand and use the concept of polymorphism • understand and use the concept of encapsulation • understand and use the concept of abstract classes and data • understand and use the concepts of composition and aggregation • develop object oriented programs based on C++ programming language
Prerequisites	None
Teaching methods	Lectures, Labs, Exercises
Assessment methods	Written final exam (70%), Exercises (30%)
Language of instruction	Greek

Recommended bibliography	[1] Deitel Harvey M.,Deitel Paul J., C++ Προγραμματισμός 6η Έκδοση, Χ. ΓΚΙΟΥΡΔΑ & ΣΙΑ ΕΕ, 2011. [2] Savitch Walter, Πλήρης C++, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2011.

Course title	**Telecommunication Networks**
Course code	MK11
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	2nd
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE203/
Hours per week	4
Instructor(s)	Eirini Karapistoli (Adjunct Lecturer)
Course content	Overview of networking technologies. Switching principles and techniques. Circuit and Packet Switching. Routing. Traffic and congestion control. Access networks. X-DSL Technologies, X.25, Frame Relay, ATM. Telephone Network. Mobile Communication Networks. Synchronous Digital Hierarchy. Signaling systems. Common Channel Signaling No. 7 (CCS7). Call and Service Control. Intelligent Networks. Quality of Service (QoS). Telecommunication Traffic Modeling. Network Management.
Expected learning outcomes and competences to be acquired	The course objective is the comprehension and learning of the various networking technologies. In this context, a wide range of issues are addressed, aiming to cover telecommunication networks and techniques for network design, development, management and evaluation.
Prerequisites	None
Teaching methods	The course is taught via lectures, while students actively participate. The lectures are supported with presentations in power point, which are available to the students via the asynchronous tele-education platform. Exercises are solved. Additionally, laboratorial exercises are carried out with the help of simulation programs.

Assessment methods	Course assessment is conducted by written exams taking place at the middle and the end of the semester, including questions (both open and multiple choice) as well as exercises that cover the course content (30% and 70%, respectively).
Language of instruction	Greek
Recommended bibliography	[1] Α. Αλεξόπουλος και Γ. Λαγογιάννης, "Τηλεπικοινωνίες και Δίκτυα Υπολογιστών", 8η Έκδοση, 2012, Εκδόσεις Παπασωτηρίου. [2] Ιάκωβος Βενιέρης, "Δίκτυα Ευρείας Ζώνης", 3η Έκδοση, 2012, Εκδόσεις Τζιόλα.

Course title	**Discrete Mathematics**
Course code	MK12
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	2nd
ECTS Credits	4
URL	eclass.uowm.gr/courses/ICTE201/
Hours per week	4
Instructor(s)	Kostas Stergiou (Associate Professor)
Course content	Finite and Infinite Sets. Computability. Formal Languages and Grammars. Permutations, Combinations and Discrete Probability. Relations and Functions. Graphs and Trees. Finite State Machines. Discrete Numeric Functions and Generating Functions. Recursive Relations.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will: • understand the basics of set theory • understand the basics of computability • understand the basics of formal languages and grammars • be able to calculate permutations and computations • be able to solve basic problems in graphs and trees • be able to study discrete numeric functions • understand the basics of algorithmic complexity • be able to calculate recursive functions

Prerequisites	None
Teaching methods	Lectures, exercises
Assessment methods	Written final exams (100%)
Language of instruction	Greek
Recommended bibliography	[1] Liu, *Στοιχεία Διακριτών Μαθηματικών*, Πανεπιστημιακές Εκδόσεις Κρήτης [2] Γιώργος Α. Βουτσαδάκης, Λευτέρης Μ. Κυρούσης, Χρήστος Ι. Μπούρας, Παύλος Γ. Σπυράκης, *Διακριτά Μαθηματικά*, Gutenberg - Γιώργος & Κώστας Δαρδανός, 2008

Course title	**Technology and Innovation, Introduction to Economics**
Course code	MK13
Course type	Compulsory Course
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	2nd
ECTS Credits	4
URL	http://elearn.materlab.eu/course/view.php?id=14
Hours per week	3
Instructor(s)	Yiannis Bakouros (Professor)
Course content	Size and business development – the overall financial budget of enterprises – investment and financing – financing and capital composition Styles – Foreign and Credit Capital – Developmental regimes – Other forms of finance – balance sheet and income statement – Indicators of profitability on invested capital – Balanced Scorecard.
Expected learning outcomes and competences to be acquired	The aim of this course is to introduce the student to basic economic principles, which govern the operation of the business units, to analyze the contribution of each one of them in the capital's profitability and measuring longitudinal indicators shows the effective operation of the enterprise. Also gives the student the ability to comprehend simple fundamentals that govern workplace Business Strategy, and to analyze the contribution of each aspect of the strategy to develop the business

	project
Prerequisites	
Teaching methods	Lectures (13 wks x 2 hrs theory and 2 hrs computer based laboratory exercises) and two homework projects.
Assessment methods	80% final written exam, 20% one homework project or/and a computer-based intermediate exam
Language of instruction	Greek
Recommended bibliography	E. Carayiannis, Y.L Bakouros, “Innovation and Entrepreneurship: Theoty and Practice”, 2010

Course title	**English II**
Course code	MK14
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	1st
Semester	2nd
ECTS Credits	2
URL	eclass.uowm.gr/courses/ICTE232
Hours per week	2
Instructor(s)	Sofia Christidou (Adjunct Lecturer)
Course content	Introduction to the scientific terminology of computer and telecommunications engineering. Comprehension and writing of scientific texts. Enhancement of oral skills. Content: analogue and digital circuits, signal processing, data transmission, error correction, cryptography, network topology.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to understand and assimilate information and technical terms from English-speaking sources relevant to their field of study, to exercise constructive criticism on the above, • to assess the peculiarity and writing methods of technical-scientific texts, • to redact technical-scientific texts,

	• to orally express their opinions and to make oral presentations on technical issues particularly with the use of tools such as PowerPoint, openoffice etc • to redact their documents and presentations making proper use of bibliographic sources (e.g. text or presentation structures, references in the text and in the bibliography).
Prerequisites	None
Teaching methods	Lectures
Assessment methods	Assignments – group projects (30%), final exam (70%)
Language of instruction	English
Recommended bibliography	[1] Κουτσογιάννη Ευαγγελία, *English for Electronics and Telecommunications*, Έκδοση: 2/2009, ΣΥΓΧΡΟΝΗ ΕΚΔΟΤΙΚΗ ΕΠΕ.

3rd SEMESTER

Course title	**Applied Mathematics I**
Course code	MK15
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	3rd
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE109/
Hours per week	4 (theory: 2 hours, exercises: 2 hours)
Instructor(s)	Theodoros Zygiridis (Assistant Professor)
Course content	Introduction. First-order ordinary differential equations. Separable equations. Exact equations, integrating factors. Linear equations. Solution via substitution. Higher-order ordinary differential equations. Linear equations with constant coefficients. Order reduction. Solution of inhomogeneous differential equations. Laplace transform and its use for solving differential equations. Series solution of differential equations, ordinary and singular points. Systems of differential equations, solution with the matrix method. Complex numbers. Complex functions. Differentiation of complex functions. Integration of complex functions.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to recognize the mathematical models for certain physical problems, • to identify the general form of differential equations, • to apply appropriate methods for determining partial and general solutions, • to solve initial value problems, • to determine solutions in the form of power series, • to exploit the Laplace transform, • to solve systems of differential equations, • to graphically solve certain types of differential equations, • to deal with fundamental problems of complex analysis.

Prerequisites	Elements of the following courses are required: • Mathematical Analysis I • Mathematical Analysis II • Linear Algebra
Teaching methods	Lectures, exercises
Assessment methods	Written intermediate exam (25%), written final exam (75%)
Language of instruction	Greek
Recommended bibliography	[1] W. E. Boyce - R. C. Diprima, *Στοιχειώδεις Διαφορικές Εξισώσεις & Προβλήματα Συνοριακών Τιμών*, ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ, 1999. [2] Τραχανάς Στέφανος, *Συνήθεις Διαφορικές Εξισώσεις*, ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, 2008. [3] Κάρολος Σεραφειμίδης, *Διαφορικές Εξισώσεις*, Εκδόσεις "σοφία", 2010. [4] Σταυρακάκης Νίκος, *Συνήθεις Διαφορικές Εξισώσεις*, Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ ΟΕ, 2010. [5] David Logan, J., *A First Course in Differential Equations* [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. [6] Soare, Mircea V. Teodorescu, Petre P. Toma, Ileana, *Ordinary Differential Equations* with Applications to Mechanics [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.

Course title	**Probability Theory and Statistics**
Course code	MK16
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	3rd
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH164/

Hours per week	5
Instructor(s)	Sofia Panagiotidou (Lecturer)
Course content	Descriptive statistics: data summary and presentation, frequency distribution, histogram, characteristic values (mean, median, mode, range, variance, standard deviation). Probability theory: basic concepts, events, conditional probability, addition and multiplication law of probabilities, Bayes theorem. Probability distributions, discrete and continuous random variables, expected value, variance and standard deviation. Important distributions: Bernoulli, binomial, geometric, Poisson, uniform, exponential, gamma, normal distribution and the central limit theorem, Student, X^2 and F distributions. Statistical estimation: sampling distributions, point estimation, properties of estimators, confidence intervals. Statistical hypotheses: hypothesis testing, type I and type II errors, required sample size, goodness of fit tests.
Expected learning outcomes and competences to be acquired	After the completion of the course the students should be able to apply the basic concepts and techniques of probability theory and statistical inference.
Prerequisites	Mathematical Analysis
Teaching methods	Hours of Instruction 65 (Theory: 39, Exercises: 26)
Assessment methods	Final written exam (compulsory), Intermediate written exam and/or assignments (optional)
Language of instruction	Greek
Recommended bibliography	[1] Statistics, D. P. Psoinos. Zitis Publ., 1999. [2] Probability and Statistics for Engineers, G. Ch. Zioutas, Zitis Publ., 2013.

Course title	**Algorithms and Data Structures**
Course code	MK17
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	3rd

ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE208/
Hours per week	4
Instructor(s)	Markos G. Tsipouras (Adjunct Lecturer)
Course content	Abstract Data Types. Compound Data Structures. Arrays, Pointers, Linked Lists, Stacks, Queues. Recursive Algorithms. Graphs and Trees. Searching and Sorting Algorithms. Search Trees. Hashing. Programming in C.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to understand simple and compound data structures • to develop data structure management algorithms • to develop searching and sorting algorithms • to study the algorithmic complexity • to perform asymptotic algorithmic analysis
Prerequisites	None
Teaching methods	Lectures, theoretical exercises, development of basic algorithms in C, development exercises
Assessment methods	Two mandatory exercises with oral examination (30%) Final written examination (70%)
Language of instruction	Greek
Recommended bibliography	[1] «ΔΟΜΕΣ ΔΕΔΟΜΕΝΩΝ», ΓΕΩΡΓΑΚΟΠΟΥΛΟΣ Γ.Φ., ΙΔΡΥΜΑ ΤΕΧΝΟΛΟΓΙΑΣ & ΕΡΕΥΝΑΣ-ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, 2008. [2] «ΑΛΓΟΡΙΘΜΟΙ ΣΕ C, ΜΕΡΗ 1-4: ΘΕΜΕΛΙΩΔΕΙΣ ΕΝΝΟΙΕΣ, ΔΟΜΕΣ ΔΕΔΟΜΕΝΩΝ, ΤΑΞΙΝΟΜΗΣΗ, ΑΝΑΖΗΤΗΣΗ», ROBERT SEDGEWICK, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, 2006. [3] «ΔΟΜΕΣ ΔΕΔΟΜΕΝΩΝ», ΜΠΟΖΑΝΗΣ Π.Δ., ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2006.

Course title	**Electric Circuits**
Course code	ΜΚ18
Course type	Compulsory
Course level	Undergraduate (first cycle)

Year of studies	2nd
Semester	3rd
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE163/
Hours per week	5
Instructor(s)	Theodoros Theodoulidis (Professor), Sofia Bellou (Laboratory Teaching Staff)
Course content	Introduction to the theory of Electric Circuits. Fundamental principles of Electric Circuits (electric current, voltage, Kirchhoff's laws), electric element analysis, two-port circuit circuits, complex frequency analysis (complex analysis presentation), systematic analysis methods, electric circuits theorems, coupled circuits, three-phase circuits. Laboratory: Use of appropriate software (MultiSim) for electric circuit analysis.
Expected learning outcomes and competences to be acquired	To introduce students into the fundamental knowledge of the theory and analysis of electric circuits. Students gain the necessary background in order to understand various relative concepts in consequent courses.
Prerequisites	None
Teaching methods	Theory Lectures, Laboratory Exercises & Assignments
Assessment methods	Written final exams (80 % Theory, 20 % Laboratory))
Language of instruction	Greek
Recommended bibliography	[1] Joseph A. Edminister, Ηλεκτρικά Κυκλώματα, ΕΣΠΙ ΕΚΔΟΤΙΚΗ, 1980. [2] Μάργαρης Νίκος Ι., Ανάλυση ηλεκτρικών κυκλωμάτων, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2010. [3] FOWLER, Electricity: Principles and Applications with Simulation CD, Εκδόσεις Επίκεντρο Α.Ε., 2012. [4] Relevant internet resources.

Course title	**Computer Networks I**
Course code	MK19

Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	3rd
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE126/
Hours per week	4
Instructor(s)	Eirini Karapistoli (Adjunct Lecturer)
Course content	Network design principles. The Medium Access Control (MAC) sublayer. The channel allocation problem. Multiple access protocols (ALOHA, CSMA). Ethernet (IEEE 802.3 standard). Wireless LANs (IEEE 802.11 Standard). Internetworking. TCP/IP protocol stack. The Internet Protocol (IP). Addressing and Subnetting. NAT - Network Address Translation. Internet Control Protocols (ICMP, ARP). Interdomain Routing (BGP, RIP, OSPF). IPv4, IPv6, mobile IP. TCP protocol. UDP protocol. Usage of simulation packages.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to: • understand the central theories, and protocols in the fields of computer networks • describe and analyze the hardware, software, components of a network and the interrelations. • explain networking protocols and their hierarchical relationship hardware and software. • compare protocol models and select appropriate protocols for a particular design. • explain concepts and theories of networking and apply them to various situations, classifying networks, analyzing performance, and implementing new technologies.
Prerequisites	None
Teaching methods	Lectures, laboratory sessions
Assessment methods	Written exam (70%) Laboratory exam (30%)
Language of instruction	Greek
Recommended	[1] A. S. Tanenbaum and D. J. Wetherall, Computer Networks, 5th

bibliography	Edition, Prentice Hall. [2] William Stallings, Data and Computer Communications, 8th Edition, William Stallings. [3] Douglas Comer, Computer Networks and Internets, 4th Edition, Cisco Press. [4] Douglas Comer, Internetworking with TCP/IP: Principles Protocols, and Architecture (Volume 1), 4th Edition, Cisco Press. [5] Jean Walrand, Communication Networks: A First Course, Morgan Kaufmann Series in Networking.

Course title	**Computer Architecture**
Course code	MK20
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	3rd
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE155/ & http://arch.icte.uowm.gr/courses/arch/
Hours per week	4 (2 hours theory & 2 hours laboratory)
Instructor(s)	Minas Dasygenis (Lecturer)
Course content	Introduction to Computer Systems. Central Processing Unit organization and architecture (CISC/RISC). Organization of Memory types. Memory Hierarchy. Input-Output. Cache Memory. Datapath and CPU Control. Interrupts and CPU support. Storage Systems. Multicore architectures. Performance of Computer Systems. Microprogramming. Pipeline. Reliability Issues. Branch Prediction. Out of Order execution. Superscalar. VLIW. Laboratory assignments of x86 assembly language programming.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: • the CPU types, • the architectural mechanisms for increasing CPU speed, • the CPU datapath,

	• the CPU pipeline, • the input/output mechanisms, • the peripheral interconnection to the CPU, • the data buses, • the cache memory operation, • the CPU control using assembly instructions From the laboratory assignments, students will gain the abilities to: • use the layer of assembly programming, • understand the benefits and drawbacks of using assembly language, • develop and debug assembly programs, • understand all x86 assembly constructs, • understand input/output techniques in the x86 world, • understand how to manipulate strings, • use the software and hardware interrupts, • create interrupt handlers, • to visualize graphic elements using assembly.
Prerequisites	Digital Design (not compulsory)
Teaching methods	Lectures, Powerpoint slides, Lecture Notes, in class quizzes, e-class, automated examination system i-exams, opencourses video lectures, laboratory exercises, semester group project.
Assessment methods	Written final theory exam 50%, final lab exam 10%, three mini exams 15%, 12 weekly laboratory exercises 10%, 1 semester team project 15%.
Language of instruction	Greek
Recommended bibliography	[1] Stallings William, *Οργάνωση και Αρχιτεκτονική Υπολογιστών*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2011. (https://service.eudoxus.gr/search/#a/id:18548668/0) [2] PETER NORTON, JOHN SOCHA, *ΤΟ ΒΙΒΛΙΟ ΤΗΣ ASSEMBLY ΓΙΑ ΤΑ PC*, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, 1994. (https://service.eudoxus.gr/search/#a/id:13923/0) [3] DAVID A. PATTERSON, JOHN L. HENNESSY, *ΟΡΓΑΝΩΣΗ ΚΑΙ ΣΧΕΔΙΑΣΗ ΥΠΟΛΟΓΙΣΤΩΝ: Η ΔΙΑΣΥΝΔΕΣΗ ΥΛΙΚΟΥ ΚΑΙ ΛΟΓΙΣΜΙΚΟΥ*, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, 2010. (https://service.eudoxus.gr/search/#a/id:12561945/0) [4] Hammacher Carl, Vranesic Zvonko, Zaky Safwat, *Οργάνωση και αρχιτεκτονική ηλεκτρονικών υπολογιστών*, Εκδόσεις Επίκεντρο Α.Ε, 2007. (https://service.eudoxus.gr/search/#a/id:15120/0)

4th SEMESTER

Course title	**Applied Mathematics II**
Course code	MK21
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	4th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE217/
Hours per week	4 (theory: 2 hours, exercises: 2 hours)
Instructor(s)	Theodoros Zygiridis (Assistant Professor)
Course content	Introduction to Partial Differential Equations (PDEs). Examples of PDEs. First-order PDEs. Linear, semi-linear, and quasi-linear PDEs. Characteristic curves. The Cauchy problem. Second-order PDEs, classification, standard forms. Eigenvalue problems. The Laplace equation, solution in Cartesian and polar coordinates, cases of homogeneous and inhomogeneous boundary conditions and infinite domains. Orthogonal functions, Fourier series and Fourier integrals. The heat equation, solution in finite and infinite spaces. Special functions. The wave equation, finite and infinite strings.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to identify different types of PDEs, • to derive the mathematical models for different problems, • to solve PDES with the method of characteristics, • to deal with eigenvalue problems, • to reduce PDES to their canonical forms, • to apply separation of variables and other techniques for the solution of PDEs, • to solve problems in different coordinate systems, • to solve problems in finite, semi-infinite or infinite spaces, • to use orthogonal functions and exploit Fourier series and integrals.

Prerequisites	Elements of the following courses are required: • Linear Algebra • Mathematical Analysis II • Applied Mathematics I
Teaching methods	Lectures, exercises
Assessment methods	Written intermediate exam (25%), written final exam (75%)
Language of instruction	Greek
Recommended bibliography	[1] ΤΡΑΧΑΝΑΣ ΣΤΕΦΑΝΟΣ, *ΜΕΡΙΚΕΣ ΔΙΑΦΟΡΙΚΕΣ ΕΞΙΣΩΣΕΙΣ*, ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, 2009. [2] Παντελίδης Γεώργιος Ν., Κραββαρίτης Δημήτρης, *Εισαγωγή στις διαφορικές εξισώσεις μερικών παραγώγων*, Ζήτη, 2003. [3] Richard Haberman, *ΕΦΑΡΜΟΣΜΕΝΕΣ ΜΕΡΙΚΕΣ ΔΙΑΦΟΡΙΚΕΣ ΕΞΙΣΩΣΕΙΣ*, ΓΡΗΓΟΡΙΟΣ ΧΡΥΣΟΣΤΟΜΟΥ ΦΟΥΝΤΑΣ, 2014. [4] Κυβεντίδης Θωμάς, *Μερικές διαφορικές εξισώσεις*, Ζήτη , 2009. [5] Tveito, Aslak. Golubitsky, M.Jäger, W.Marsden, J.E. Sirovich, L. Winther, Ragnar, *Introduction to Partial Differential Equations* [electronic resource], Heal- Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. [6] Myint-U, Tyn.Debnath, Lokenath, *Linear Partial Differential Equations for Scientists and Engineers* [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.

Course title	**Operating Systems**
Course code	MK22
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	4th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE189/ & http://arch.icte.uowm.gr/courses/os/
Hours per week	4 (2 hours theory & 2 hours laboratory)

Instructor(s)	Minas Dasygenis (Lecturer)
Course content	Fundamental Issues in Operating Systems. History & Evolution of OS. Processes & Scheduling. Synchronization. Interprocess Communication. Simultaneous Processes/Threads. Mutual Exclusion. Memory Management. Paging. Virtual Memory. Filesystem Management. Resource Management. Deadlocks & Livelocks. Input/Output Management. Protection and Security Issues. Windows & Unix Operating Systems. Laboratory assignments consist of windows & Linux shell scripts and operating system programming in POSIX.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: • the historical development of operating systems, • the various process states and context switching, • the benefits of using an operating system, • how applications interact with the operating system and each other • the major operating system modules (process management, deadlock, storage management, paging, caching, virtual memory, file system, protection and security), • the scheduling algorithms, • the filesystem operations, • the memory paging and segmentation, • the input/output mechanisms, From the laboratory assignments, students will gain the abilities to: • fully utilize and program the Microsoft windows and Unix shell using scripts, • fully utilize the UNIX operating systems as a development platform for POSIX C, • use all the major POSIX system calls for designing single or multithreaded, host only or interconnected processes, • write programs that interface to the operating system at the system-call level, • use a variety of user level tools to monitor the behavior of operating systems.
Prerequisites	Computer Architecture (not compulsory)
Teaching methods	Lectures, Powerpoint slides, Lecture Notes, in class quizzes, e-class, automated examination system i-exams, opencourses video lectures, laboratory exercises, semester group project.

Assessment methods	Written final theory exam 50%, final lab exam 10%, three mini exams 15%, 12 weekly laboratory exercises 10%, 1 semester team project 15%.
Language of instruction	Greek
Recommended bibliography	[1] ANDREW S. TANENBAUM, *ΣΥΓΧΡΟΝΑ ΛΕΙΤΟΥΡΓΙΚΑ ΣΥΣΤΗΜΑΤΑ*, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, 2009. [https://service.eudoxus.gr/search/#a/id:13884/0] [2] Stallings William, *Λειτουργικά συστήματα*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2009. [https://service.eudoxus.gr/search/#a/id:18548948/0] [3] MARC J. ROCHKIND, *ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΣ ΣΕ UNIX*, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ, 2007. [https://service.eudoxus.gr/search/#a/id:13863/0] [4] ELMASRI, *Operating Systems: A Spiral Approach*, Εκδόσεις Επίκεντρο Α.Ε., 2009. [https://service.eudoxus.gr/search/#a/id:12562525/0]

Course title	**Signal and System Theory**
Course code	MK23
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	4th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE234/
Hours per week	4
Instructor(s)	Markos G. Tsipouras (Adjunct Lecturer)
Course content	Signal and system classification. Elementary signals. Generalized functions. Linear time invariant systems. Convolution. Impulse response. Fourier transform and series. Frequency response. Laplace transform. Transfer functions. Stability. Sampling. Filters.
Expected learning outcomes and competences	Upon successful completion of this course, students will be able: • to classify signals and systems based on their properties , • to compute convolutions ,

to be acquired	• to describe signals using transform / series Fourier, • to apply Laplace transform, • to manage generalized functions , • to study the stability of linear systems • to compute system response , • to determine the effect of filters on signals , • to apply the sampling theorem and describe the connection signal continuous and discrete time.
Prerequisites	None
Teaching methods	Lectures, theoretical exercises, development exercises
Assessment methods	Two mandatory exercises (30%) Final written examination (70%)
Language of instruction	Greek
Recommended bibliography	[1] Θεοδωρίδης Σέργιος, Μπερμπερίδης Κώστας, Κοφίδης Λευτέρης, Εισαγωγή στη θεωρία σημάτων και συστημάτων, Γ. ΔΑΡΔΑΝΟΣ - Κ. ΔΑΡΔΑΝΟΣ, 2003. [2] Oppenheim, Willsky, Nawab, ΣΗΜΑΤΑ ΚΑΙ ΣΥΣΤΗΜΑΤΑ, ΓΡΗΓΟΡΙΟΣ ΧΡΥΣΟΣΤΟΜΟΥ ΦΟΥΝΤΑΣ, 2011. [3] Θεόδωρος Αλεξόπουλος, ΕΙΣΑΓΩΓΗ ΣΤΗΝ ΑΝΑΛΥΣΗ ΣΗΜΑΤΟΣ, Πανεπιστημιακές, Εκδόσεις ΕΜΠ, 2011.

Course title	**Computer Networks II**
Course code	MK24
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	4th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE143/
Hours per week	4
Instructor(s)	Eirini Karapistoli (Adjunct Lecturer)
Course content	Network Management. Network Security. Quality of Service (IntServ,

	DiffServ). Multimedia Services and Networking. Introduction to application protocols. E-mail. FTP. Domain Name System (DNS). Peer Networks, Content Delivery Networks (CDNs). The World Wide Web, SOCKET programming. Implementation of communication protocols. Usage of simulation packages.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to: • understand modern techniques, protocols, and applications across the area of computer networks. • investigate, analyze, and document the core issues and requirements in building effective computernetworks. • adapt their knowledge to new and emerging technologies, such as MPLS, cloud computing, as well as modern Internet technologies such as IPv6, Internet of Things, etc., based on a solid understanding of the underpinning principles.
Prerequisites	None
Teaching methods	Lectures, laboratory sessions
Assessment methods	Written exam (70%) Laboratory exam (30%)
Language of instruction	Greek
Recommended bibliography	[1] A. S. Tanenbaum and D. J. Wetherall, Computer Networks, 5th Edition, Prentice Hall. [2] William Stallings, Data and Computer Communications, 8th Edition, William Stallings. [3] Douglas Comer, Computer Networks and Internets, 4th Edition, Cisco Press. [4] Douglas Comer, Internetworking with TCP/IP: Principles Protocols, and Architecture (Volume 1), 4th Edition, Cisco Press. [5] Jean Walrand, Communication Networks: A First Course, Morgan Kaufmann Series in Networking.

Course title	**Electronics I**
Course code	MK25
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	2nd

Semester	4th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE145/
Hours per week	5
Instructor(s)	Sotiria Psoma (Laboratory Teaching Staff)
Course content	Introduction, Theorems Thevenin and Norton, Theory of Semiconductors, Intrinsic and Extrinsic Semiconductors. Junction p-n. Diodes, Three Approaches, Polarisation characteristics. Diode Circuits, Special Diodes, Diode Zener, Schottky Diode and Varactor. Bipolar Junction Transistors, Transistor Fundamentals, Line and Point Load Operation Q. Transistor Biasing. AC Models, Transistor Models π and T. Voltage Amplifiers (CE). Current Amplifiers (CC), Darlington transistors and Power Amplifiers. Introduction to Differential and Operational Amplifiers.
Expected learning outcomes and competences to be acquired	The module Electronics I is a clearly explained in depth introduction to electronic semiconductors devices and circuits and their concepts. It provides essential understanding of semiconductor device characteristics, testing and practical circuits. It establishes the foundation of the electronics principles of the diodes and the bipolar transistors. Also, the student can understand the operation and troubleshooting of electronics systems. The student acquires knowledge about the use of the above circuits and learns how to solve and deal with related practical problems and issues. In addition the students acquire the knowledge and practical skills to analyse and understand the above electronic circuits. With the appropriately designed laboratory exercises and circuits that the students are required to prepare, they acquire the experience to construct and characterise experimentally a series of practical circuit and at the same they learn how to use efficiently laboratoty instrumentation.
Prerequisites	None (Electrical Circuits)
Teaching methods	Lectures, 2 hours/weekly Laboratory Practical Exercises and tutorials
Assessment methods	• Interim Progress Exam Test, Delivery of weekly written lab exercises, Final Examination Laboratory (prerequisite base 5 in the final examination laboratory), Final Theory Examination (prerequisite base 5 in the final examination of the theory). • Final Course Grade (100%): Final written examination theory (added the bonus of the Interim Progress Exam Test) = 75% Final Written Examination and Laboratory = 25%.

Language of instruction	Greek
Recommended bibliography	[1] ΧΑΡΙΤΑΝΤΗΣ ΓΙΑΝΝΗΣ, ΗΛΕΚΤΡΟΝΙΚΑ 1, ΔΕΜΕΡΝΤΖΗΣ ΠΑΝΤΕΛΗΣ, 2006. [2] ΧΑΡΙΤΑΝΤΗΣ ΓΙΑΝΝΗΣ, ΗΛΕΚΤΡΟΝΙΚΑ 2, ΔΕΜΕΡΝΤΖΗΣ ΠΑΝΤΕΛΗΣ, 2007. [3] Schultz, Grob's Basic Electronics w/Student CD, Εκδόσεις Επίκεντρο Α.Ε. [4] Malvino A., Bates D., Ηλεκτρονική, 7η Έκδοση, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2012.

Course title	**Mathematical Modeling and Numerical Analysis**
Course code	MK26
Course type	Mandatory
Course level	Undergraduate (first cycle)
Year of studies	2nd
Semester	4th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH172/
Hours per week	5
Instructor(s)	Rafaela Sotiropoulou (Lecturer)
Course content	Basic concepts Basics of analysis. Approximation and Errors. Solving Nonlinear Equations. Numerical Interpolation and Polynomial Approximation. Numerical Differentiation and Integration. Ordinary Differential Equations. Direct Methods for Solving Linear Systems. Iterative Methods for Solving Linear Systems.
Expected learning outcomes and competences to be acquired	The objective of this course is to teach the student the approximate solving of complex problems that are not amenable to exact solution by applying numerical methods and implementation of these solutions with computer programs. After the teaching of this course the student should include integrated approaches towards the principles and use of classical methods of numerical analysis in the science of engineering with examples and applications. Furthermore, he must acquire knowledge of basic principles, in order to deepen in the future in the development and improvement of such methods.

Prerequisites	Mathematical Analysis I, II, Applied Mathematics I, Introduction to Structured Programming
Teaching methods	Hours of Instruction 65 (Theory: 39, Exercises: 26)
Assessment methods	Final written exam (compulsory), Intermediate written exam (optional), Weekly exercises (compulsory).
Language of instruction	Greek
Recommended bibliography	[1] Αριθμητική ανάλυση με εφαρμογές σε Matlab και Mathematica, Παπαγεωργίου, Γεώργιος Σ., Εκδόσεις Συμεών. [2] Numerical Analysis, J. Douglas Faires, Richard L. Burden, Thomson Brooks/Cole.

5th SEMESTER

Course title	**Electromagnetic Waves**
Course code	MK27
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	5th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE174/
Hours per week	4 (theory: 2 hours, exercises: 2 hours)
Instructor(s)	Theodoros Zygiridis (Assistant Professor)
Course content	Time-varying fields, displacement current, Maxwell's equations, wave equation, retarded potentials, Poynting vector. Plane waves, polarization, propagation. Reflection and transmission. Transmission lines, TEM waves, telegrapher's equations. Waveguides, TE and TM modes, dielectric waveguides. Electromagnetic radiation and antennas, short dipole, half-wavelength dipole, antenna arrays, radiation pattern.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to recognize the differences between static and time-varying fields, • to determine the electric-field using the magnetic-field intensity, and vice versa, • to use complex representations of electromagnetic quantities, • to understand the properties and behavior of electromagnetic fields, • to know the impact of propagation media on wave properties, • to solve simple problems involving reflection and transmission of waves, • to solve problems pertinent to transmission lines, using circuit models, • to determine the characteristics of waveguide structures that fulfill certain constraints, • to study the properties of simple antennas.

Prerequisites	Elements of the following courses are required: • Electromagnetism, • Mathematical Analysis II.
Teaching methods	Lectures, exercises
Assessment methods	Written intermediate exam (25%), written final exam (75%)
Language of instruction	Greek
Recommended bibliography	[1] Τσιμπούκης Δ. Θεόδωρος, *Ηλεκτρομαγνητικό Πεδίο*, Πανεπιστημιακές Εκδόσεις Κρήτης, 2014. [2] Shen Liang Chi, Kong Jin Au, *Εφαρμοσμένος Ηλεκτρομαγνητισμός*, ΣΤΕΛΛΑ ΠΑΡΙΚΟΥ & ΣΙΑ, 2007 [3] Kraus John D., *Ηλεκτρομαγνητισμός*, Εκδόσεις Α. Τζιόλα & Υιοί, 2011.

Course title	**Digital Signal Processing**
Course code	MK28
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	5th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE113/
Hours per week	4
Instructor(s)	Markos G. Tsipouras (Adjunct Lecturer)
Course content	Sampling Signal, Oversampling, Subsampling, Frequency Folding, Convolution, Correlation, Discrete Fourier Transform, Z Transform, FIR Digital Filter Design, IIR Digital Filter Design. Applications using MatLab.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to understand simple and complex digital signal processing concepts • to perform signal sampling, oversampling and subsampling • to calculate signals convolution and correlation

	• to apply DFT and ZT in real or complex signals • to design FIR and IIR digital filters • to develop software for all the above in MatLab
Prerequisites	None
Teaching methods	Lectures, theoretical exercises, examples in MatLab, exercises in MatLab
Assessment methods	One optional exercise with oral examination (40%) Final written examination (60%)
Language of instruction	Greek
Recommended bibliography	[1] ΨΗΦΙΑΚΗ ΑΝΑΛΥΣΗ ΣΗΜΑΤΟΣ, PROAKIS J., MANOLAKIS D., ΕΚΔΟΣΕΙΣ Ίων, 2010. [2] ΒΑΣΙΚΕΣ ΤΕΧΝΙΚΕΣ ΨΗΦΙΑΚΗΣ ΕΠΕΞΕΡΓΑΣΙΑΣ ΣΗΜΑΤΩΝ, ΜΟΥΣΤΑΚΙΔΗΣ Γ.Β., ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2004. [3] ΨΗΦΙΑΚΗ ΕΠΕΞΕΡΓΑΣΙΑ ΣΗΜΑΤΟΣ, HAYES M.H., ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2000. [4] ΨΗΦΙΑΚΗ ΕΠΕΞΕΡΓΑΣΙΑΣ ΣΗΜΑΤΟΣ, ΦΩΤΟΠΟΥΛΟΣ Σ.Δ., ΕΚΔΟΣΕΙΣ ΟΛΥΜΠΙΑ ΑΝ. ΦΩΤΟΠΟΥΛΟΥ, 2010.

Course title	**Communications Systems I**
Course code	MK29
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	5th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE184/
Hours per week	4
Instructor(s)	Stratogiannis Dimitrios (Adjunct Lecturer)
Course content	Communication Systems model. Representation of Signals and Systems in Time and Frequency. Spectrum Density. Signal transmission through Linear Filters. Hilbert transform. Bandpass Signals and Systems. Stochastic Processes. Power Spectral Density. Gauss Stochastic Process. Amplitude Modulation and Demodulation.

	Quadrature Amplitude Modulation. Frequency Division Multiplexing. Angle Modulation and Demodulation. Noise. Noise effect on modulations.
Expected learning outcomes and competences to be acquired	Comprehension of the following main theory parts: • Analog and Digital Communications • Representation of Signals and Systems in Time and Frequency • Fourier Transforms and their application in Communications • Filters and Signals • Amplitude Modulation and Demodulation • Frequency Division Multiplexing • Angle and Frequency Modulation and Demodulation Implementation of Laboratory Exercises: • Familiarization with the equipment of the Telecommunication Systems Lab. • Laboratory Exercise on AM. • Laboratory Exercise on FM.
Prerequisites	None
Teaching methods	• Lectures • Exercises • Laboratory Exercises
Assessment methods	Written Final Exam (100%)
Language of instruction	Greek
Recommended bibliography	[1] Haykin Simon, Moher Michael, *Communication Systems*, 2010. [2] Καραγιαννίδης Γ, *Τηλεπικοινωνιακά Συστήματα*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2010. [3] Κωττής Παναγιώτης Γ., *Εισαγωγή στις Τηλεπικοινωνίες*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2011.

Course title	**Electronics II**
Course code	MK30
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd

Semester	5th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE112/
Hours per week	5
Instructor(s)	Sotiria Psoma (Laboratory Teaching Staff)
Course content	Field Effect Transistor (FET, MOSFET, CMOS), Fundamentals, Biasing, Basic Principles of MOSFET Amplifiers. Frequency Effects, Frequency Response of an Amplifier, Decibel Voltage Gain and Power Diagrams, Bode, Effect Miller. Differential Amplifiers, Analysis of DC and AC, Common-Mode Gain. Operational Amplifiers, Operational Amplifier 741. Negative Feedback, Topologies, Bandwidth. Linear Circuits Operational Amplifiers, Inverting and Noninverting Amplifiers, Differential Amplifiers, Instrumentation Amplifiers, Summing Amplifier Circuits, Power Amplifiers. Nonlinear Circuits Operational Amplifiers. Oscillators, The 555 Timer, Monostable and Astable Operation of the 555 Timer, The Phase Locked Loop Oscillator.
Expected learning outcomes and competences to be acquired	This course is an introduction to electronic circuits with MOSFET transistors, Op-Amp circuits and filters. The student acquires knowledge of the scope of the above circuits and learns how to use these skills to solve and deal with related practical problems and issues. In addition the students acquire the knowledge and practical skills to analyse and understand the above electronic circuits. With the appropriately designed laboratory exercises and circuits that the students are required to prepare, they acquire the experience to construct and characterise experimentally a series of practical circuit and at the same they learn how to use efficiently laboratory instrumentation.
Prerequisites	Electronics I
Teaching methods	Lectures, 2 hours/weekly Laboratory Practical Exercises and tutorials
Assessment methods	• Interim Progress Exam Test, Submission of weekly written lab exercises, Final Examination Laboratory (prerequisite base 5 in the final examination laboratory), Final Theory Examination (prerequisite base 5 in the final examination of the theory). • Final Course Grade (100%): Final written examination theory (added the bonus of the Interim Progress Exam Test) = 75% Final Written Examination and Laboratory = 25%.
Language of	Greek

instruction	
Recommended bibliography	[1] Malvino A.P., Bates D.J., Electronics Principles, Εκδόσεις Επίκεντρο A.E., 2007. [2] Jaeger Richard C., Μικροηλεκτρονική, τόμος Β΄, Εκδόσεις Α. Τζιόλα & Υιοί, 1999. [3] Millman Jacob, Grabel Arvin, Μικροηλεκτρονική, τόμος Β΄, Εκδόσεις Α. Τζιόλα & Υιοί, 2000. [4] Τόμπρας Γ. Σπ., Εισαγωγή στην Ηλεκτρονική, Εκδόσεις Δίαυλος, 2006.

Course title	**Object-Oriented Programming II**
Course code	MK31
Course type	Mandatory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	5th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE225/
Hours per week	4
Instructor(s)	P. Karvelis (Adjunct Lecturer)
Course content	Object-oriented programming in Java. Abstract and concrete classes, interfaces. Properties and objects. Methods, messages, method overloading and overriding. Program control constructs. Arrays and dynamic structures. Debugging a program using an IDE. Inheritance, polymorphism and encapsulation. Exception handling.
Expected learning outcomes and competences to be acquired	The student is expected to be able to develop an integrated application implementing inheritance, polymorphism, and threads in the Java.
Prerequisites	None
Teaching methods	Lectures and labs
Assessment methods	Labs, Assignments and exams

Language of instruction	Greek
Recommended bibliography	[1] Savitch Walter, Absolute Java (includes CD), STELLA Parikia & Co., 2008. [2] Deitel Paul J., Deitel Harvey M., Java Programming, Ch Giourdas & Co., 2010. [3] Deitel Harvey M., Deitel Paul J., C + + Programming 6th Edition, Ch Giourdas & Co., 2011.

Course title	**Operations Research**
Course code	MK32
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	5th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH165/
Hours per week	5
Instructor(s)	George Nenes (Assistant Professor)
Course content	Introduction to optimization, mathematical programming models, variables, objective function parameters, constraints. Linear programming theory, graphical solution, Simplex method, sensitivity analysis. Linear programming problem solving using computer software (lindo, lingo, EXCEL solver). Integer programming. Branch and Bound algorithm. Binary programming. Applications to real-world problems.
Expected learning outcomes and competences to be acquired	Understanding the basic mathematical programming (Linear and Non-linear) concepts and methods. Ability to model real-world operational problems by the development of appropriate mathematical programming models. Ability to solve mathematical programming models by employing the appropriate operations research methodologies and algorithms. The ability to handle data and solve mathematical programming models using computer software. The ability to perform sensitivity analyses on the results of operations research problems. Interpretation of the results of an operations

	research problem's solution.
Prerequisites	Statistics
Teaching methods	Hours of Instruction 65 (Theory: 39, Exercises: 26)
Assessment methods	Final written exam (compulsory) , Intermediate written exam (optional)
Language of instruction	Greek
Recommended bibliography	[1] Case Studies of Operations Research, Vol. A, A. K. Georgiou, G. S. Oikonomou, G. D. Tsiotras. Benou Publ., 2006. [2] Quantitative Analysis, Vol. A and B, D. P. Psoinos. Ziti Publ., 1993. [3] Operations Research, P. G. Ypsilantis. Propobos Publ., 2007. [4] Quantitative Analysis for Management Decision Making, Vol. A and B, G. S. Oikonomou, A. K. Georgiou. Benou Publ., 2000. [5] Introduction to Operations Research, Hamdy A. Taha, translation: A. I. Margaris. Tziola Publ., 2011.

6th SEMESTER

Course title	**Software Engineering**
Course code	MK33
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3th
Semester	2nd
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE135/
Hours per week	4
Instructor(s)	Kostas Stergiou (Associate Professor)
Course content	Introduction to Software Engineering. Software development models. Software life cycle. Software requirements. Data flow diagrams, structure diagrams. Software design. Software coding and documentation. Software testing, testing tools. Object-oriented software systems development, the UML modeling language: Class and interaction diagram, state and activity diagram. Systems specification models.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will: • understand the basics of software engineering • be able to perform requirements analysis • be able to efficiently design software • be able to efficiently implement software • know the basic software testing techniques • be able to use UML for all aspects of requirements analysis and software design
Prerequisites	None
Teaching methods	Lectures, project
Assessment methods	Written final exams (65%), Project (35%)
Language of instruction	Greek

Recommended bibliography	[1] SHARI, LAWRENCE, PFLEEGER, *ΤΕΧΝΟΛΟΓΙΑ ΛΟΓΙΣΜΙΚΟΥ: ΘΕΩΡΙΑ ΚΑΙ ΠΡΑΞΗ*, Κλειδάριθμος [2] IAN SOMMERVILLE, *ΒΑΣΙΚΕΣ ΑΡΧΕΣ ΤΕΧΝΟΛΟΓΙΑΣ ΛΟΓΙΣΜΙΚΟΥ,* Κλειδάριθμος [3] MARTIN FOWLER, *ΕΙΣΑΓΩΓΗ ΣΤΗ UML: ΣΥΝΟΠΤΙΚΟΣ ΟΔΗΓΟΣ ΤΗΣ ΠΡΟΤΥΠΗΣ ΓΛΩΣΣΑΣ ΜΟΝΤΕΛΟΠΟΙΗΣΗΣ ΑΝΤΙΚΕΙΜΕΝΩΝ,* Κλειδάριθμος

Course title	**Parallel and Distributed Systems**
Course code	MK34
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	6th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE161/ & http://arch.icte.uowm.gr/courses/parallel/
Hours per week	4 (2 hours theory & 2 hours laboratory)
Instructor(s)	Minas Dasygenis (Lecturer)
Course content	Introduction to Parallel Systems. History of Parallel and Distributed Systems. Von Neumann organization. Flynn taxonomy. Pipeline. Multi computer systems and multi-core. Distributed and shared memory. Uniform and non-uniform Memory Architectures. Performance estimation. Scaling. Interconnection networks. Laws of Grosch, Amdahl, Gustafson-Barsis. Designing and programming parallel applications. MPI. Synchronization. Dependencies Graph. Scheduling. Shared Memory coherence. MESI. Parallel Processing at GPU. Models and communication mechanisms of processes. Vector Processing. Cluster & Grid Computing. Parallelizing application examples. Synchronization issues. Laboratory assignments of parallel programming of OpenMPI, OpenMP, threads and CUDA.
Expected learning outcomes and competences	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: • the reasons that the sequential computing has been

to be acquired	abandoned, • the similarities and differences of parallel architectures, • the CPU cores interconnection networks, • the memory coherency problems and the possible solutions, • the significance of the clock synchronization of distributed systems, • the multi-core CPU and GPU strengths and weaknesses, • the granularity of the parallel processing. From the laboratory assignments, students will gain the abilities to: • scale an application, • transform an application to exploit the available parallelism, • develop and debug parallel programs, • utilize the openmpi framework for distributed parallel systems, • utilize the openmp framework for shared memory parallel systems, • utilize the cuda framework for GPU parallel systems, • utilize the POSIX threads for shared memory parallel systems, • utilize a batch submission system for the grid, • utilize a batch submission system for a computer cluster, • analyze and locate application hotspots, • measure the performance of parallel and distributed systems, • identify the best architectures and system for solving a given computational problem.
Prerequisites	Operating Systems, C Programming (not compulsory)
Teaching methods	Lectures, Powerpoint slides, Lecture Notes, in class quizzes, e-class, automated examination system i-exams, opencourses video lectures, laboratory exercises, semester group project.
Assessment methods	Written final theory exam 50%, final lab exam 10%, three mini exams 15%, 12 weekly laboratory exercises 10%, 1 semester team project 15% .
Language of instruction	Greek
Recommended bibliography	[1] ANDREW S. TANENBAUM, MAARTEN VAN STEEN, ΚΑΤ*ΑΝΕΜΗΜΕΝΑ ΣΥΣΤΗΜΑΤΑ: ΑΡΧΕΣ ΚΑΙ ΥΠΟΔΕΙΓΜΑΤΑ*, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ, 2006. [13777] https://service.eudoxus.gr/search/#a/id:13777/0 [2] DAVID B. KIRK, WEN-MEI W. HWU, *ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΣ ΜΑΖΙΚΑ ΠΑΡΑΛΛΗΛΩΝ ΕΠΕΞΕΡΓΑΣΤΩΝ*, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ, 2010. [12279261] https://service.eudoxus.gr/search/#a/id:12279261/0

	[3] ΣΤΕΛΙΟΣ ΠΑΠΑΔΑΚΗΣ, ΚΩΣΤΑΣ ΔΙΑΜΑΝΤΑΡΑΣ, *ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΣ ΚΑΙ ΑΡΧΙΤΕΚΤΟΝΙΚΗ ΣΥΣΤΗΜΑΤΩΝ ΠΑΡΑΛΛΗΛΗΣ ΕΠΕΞΕΡΓΑΣΙΑΣ*, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ, 2012. [12532275] https://service.eudoxus.gr/search/#a/id:12532275/0

Course title	**Web Programming**
Course code	MK35
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	6th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE196/
Hours per week	4
Instructor(s)	S. Kontogiannis (Adjunct Lecturer)
Course content	X(HTML 1.0) documents, text formatting, images, links , forms. Server side programming (PHP), client side programming (Javascript). Variables, functions, tables, data bases, objects and events. Cascade Style Sheets. Document Object Model. Asynchronous programming (AJAX). Website security.
Expected learning outcomes and competences to be acquired	Students will be able to design and implement an integrated, safe web application that supports data acquisition and storing.
Prerequisites	None
Teaching methods	Lectures, exercises, lab exercises
Assessment methods	50% written final exams, 20% lab exercises, 30% semester project
Language of instruction	Greek
Recommended bibliography	[1] Παναγιώτης Κεντερλής, Ανάπτυξη Διαδικτυακών Εφαρμογών, Θεωρία και Πράξη, Π.Δ Κεντερλής, 2009 [2] Welling Luke, Thomson Laura, Ανάπτυξη Web Εφαρμογών με

	PHP και MySQL, 4η Έκδοση, Χ. ΓΚΙΟΥΡΔΑ & ΣΙΑ, 2011.

Course title	**Communications Systems II**
Course code	MK36
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	6th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE126/
Hours per week	4
Instructor(s)	Stratogiannis Dimitrios (Adjunct Lecturer)
Course content	Sample Theorem. Bandpass Signal Sampling. Time Division Multiplexing. Pulse Amplitude Modulation. Pulse Position Modulation. Digital Pulse Modulation. Modulation Codes. Runlength-Limited Codes. Pulse Code Modulation. Modulation techniques ASK, FSK, PSK, QPSK, MSK, DPSK. Trellis diagram. Maximum Likelihood detector. Digital transmission in Additive White Gaussian Noise channel. Intersymbol Interference effect.
Expected learning outcomes and competences to be acquired	This undergraduate course is the next part of the Communications Systems I course. It aims at studying digital modulations for signal transmission. In the first part sampling process is examined and then the selection of the appropriate modulation and coding techniques for transmission. Finally, the reception and detection of the digital transmitted signal is studied. The student after this course will be capable to design and evaluate a digital communication system throughout its stages starting from the receiver to the transmitter. The laboratory exercises will contribute to the improved realization of theory and the comprehension of the theoretic lectures given during the semester.
Prerequisites	None
Teaching methods	• Lectures • Exercises • Laboratory Exercises

Assessment methods	Written Final Exam (100%)
Language of instruction	Greek
Recommended bibliography	[1] Καραγιαννίδης Γ., *Τηλεπικοινωνιακά Συστήματα*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2010. [2] J. PROAKIS, M. SALEHI, *Communication Systems Engineering*, 2003.

Course title	**Algorithms Analysis and Design**
Course code	MK37
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	6th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE114/
Hours per week	4
Instructor(s)	Markos G. Tsipouras (Adjunct Lecturer)
Course content	Analysis of Algorithms, Complexity of Algorithms, Asymptotic Analysis. Algorithms Design, Recursive Algorithms, Divide-and-Conquer Algorithms, Dynamic Programming, Greedy algorithms, probabilistic algorithms. Graph and Networks Algorithms. Computational Complexity, classes P and NP, NP-completeness.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able: • to perform analysis of algorithms, • to study algorithmic complexity • to perform asymptotic analysis • to implement recursive and greedy algorithms, • to implement algorithms by applying the principles of dynamic programming, • to understand and apply algorithms for graphs and networks, • to understand the classes P and NP.
Prerequisites	None

Teaching methods	Lectures, theoretical exercises, development exercises
Assessment methods	Two mandatory exercises with oral examination (30%) Final written examination (70%)
Language of instruction	Greek
Recommended bibliography	[1] CORMEN T.H., LEISERSON C.E., RIVEST R.L., STEIN C., ΕΙΣΑΓΩΓΗ ΣΤΟΥΣ ΑΛΓΟΡΙΘΜΟΥΣ, ΤΟΜΟΣ Ι, ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, 2009. [2] SANJOY DASGUPTA, CHRISTOS PAPADIMITRIOU, UMESH VAZIRANI, ΑΛΓΟΡΙΘΜΟΙ, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ, 2009. [3] Μποζάνης Παναγιώτης Δ., Αλγόριθμοι, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2006.

Course title	**Databases**
Course code	MK38
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	3rd
Semester	6th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE215/
Hours per week	4
Instructor(s)	E. Karvounis (Adjunct Lecturer)
Course content	Introduction to Data Bases (DB) and to Data Base Management Systems (DBMS). Database Architecture, Entity Relationship models, Relational model, Relational algebra and logic. SQL. Functional dependencies and Normalization. Physical DB organization and storage. Indexes. Query optimization.
Expected learning outcomes and competences to be acquired	On successful completion of the course the students will be able to: • Design, implement and manage a new Database. (with SQL queries) • Understand the architecture of a DB. • Normalize a DB.

Prerequisites	None
Teaching methods	Lectures, exercises, lab exercises
Assessment methods	60% written final exams, 20% lab exercises, 20% semester project
Language of instruction	Greek
Recommended bibliography	[1] Elmasri Ramez, Navathe Shamkant B., Θεμελιώδεις αρχές συστημάτων βάσεων δεδομένων, ΔΙΑΥΛΟΣ Α.Ε. ΕΚΔΟΣΕΙΣ ΒΙΒΛΙΩΝ, 2007. [2] Ramakrishnan Raghu, Gehrke Joahannes, Συστήματα Διαχείρισης Βάσεων Δεδομένων, 3η Έκδοση, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2012.

7th SEMESTER

Course title	**Artificial Intelligence**
Course code	Y1
Course type	Compulsory
Course level	Undergraduate (second cycle)
Year of studies	4th
Semester	1st
ECTS Credits	5
URL	eclass.uowm.gr/courses/ ICTE107/
Hours per week	4
Instructor(s)	Kostas Stergiou (Associate Professor)
Course content	Introduction to Artificial Intelligence. Intelligent Agents. Blind Search, Heuristic Search, Local Search, Constraint Satisfaction Problems. Propositional Logic: Syntax and Semantics, Logical Inference, Proof Methods, Resolution. Predicate Logic: Syntax and Semantics. Planning: Basic Principles and Algorithms. Machine Learning: Inductive Learning, Decision Trees.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will: • understand the basics of intelligent systems • know how to implement uninformed and informed search algorithms • understand the theory and practice of constraint satisfaction • be able to reason with propositional logic • know the basic principles of planning • understand the basics of machine learning
Prerequisites	None
Teaching methods	Lectures, exercises, projects
Assessment methods	Written final exams (80%), Projects (20%)
Language of instruction	Greek

Recommended bibliography	[1] Russell & Norvig, *Τεχνητή Νοημοσύνη: Μια Σύγχρονη Προσέγγιση*, Κλειδάριθμος, 2004 [2] Βλαχάβας, Κεφαλάς, Βασιλειάδης, Κόκκορας, Σακελλαρίου, *Τεχνητή Νοημοσύνη,* Εκδόσεις Γαρταγάνης, 2005

Course title	**Analysis and Simulation of Communication Networks**
Course code	Y2
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	7th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE175/
Hours per week	4
Instructor(s)	Panagiotis Sarigiannidis (Lecturer)
Course content	Basic Simulation Modelling. Systems, Models and Simulation. Different simulation types. Monte Carlo Simulation. Queueing system simulation. Modeling complex systems. Simulation Software (Matlab, ns-2/3, Opnet, OmNET ++, NetSim). Selecting input probability distributions. Generating random numbers and random variates. Statistical analysis of simulation output: Means, variances, confidence intervals etc). Simulation of Communication Systems and Networks. Verification, validation, and accreditation through Simulation.
Expected learning outcomes and competences to be acquired	• to understand the main modeling and simulation issues. • to perceive and utilize Monte Carlo technique. • to develop programming techniques using event-driven simulation. • to design and produce random variables and input probability distribution. • to perform I/O statistical analysis in simulation frameworks. • to simulate main communication network protocols. • to manage the development of simulation programs. • to evaluate and collect simulation performance metrics.
Prerequisites	None
Teaching methods	Lectures, Labs, Lab Tasks, Semester Project

Assessment methods	Written final exam (60%), Lab Tasks (30%), Project Presentation (10%), Oral exam (∓20%)
Language of instruction	Greek
Recommended bibliography	[1] Ρουμελιώτης, Σουραβλάς, *Τεχνικές Προσομοίωσης*, Εκδόσεις Τζιόλα, 978-960-418-372-2 2011. [2] Β. Τσαουσίδης, Ε. Μαμάτας, Ι. Ψαρράς, Ε. Κοσμίδης, Σ. Δημητρίου, *Εργαστηριακά Μαθήματα στα Δίκτυα και Διαδίκτυα Υπολογιστών*, Εκδόσεις Κλειδάριθμος, 2010. [3] M. Law W. D. Kelton, "Simulation Modeling and Analysis, McGraw-Hill, Inc, 1991. [4] H. Perros, "Computer Simulation Techniques - The Definitive Introduction", 2003. free download from http://www.csc.ncsu.edu/faculty/perros//simulation.pdf

Course title	**Antenna Systems and Wireless Propagation**
Course code	Y3
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	7th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE212/
Hours per week	4
Instructor(s)	Lalas Antonios (Adjunct Lecturer)
Course content	Electromagnetic wave, Fundamental parameters of antennas, Radiation fundamentals, Linear wire antennas, Loop antennas, Arrays, Folded dipole antenna, Yagi-Uda antenna, Log-periodic antenna, Horn antennas, Microstrip antennas, Reflector antennas. Wireless channel, Propagation mechanisms, Propagation models, Terrestrial fixed links, Propagation at different wireless systems (Macrocell, Microcell, Picocell, Megacell), Overcoming channel impairments, RF link planning. Lab for antenna measurements based on the lab-volt measurement

	kit.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to: • Understand basic concepts of simple antennas • Categorize and utilize antennas depending on the application • Design antennas with defined specifications • Understand basic concepts of RF links • Categorize and utilize wireless channels • Design simple RF links and calculate power budget • Recognize real antenna systems and conduct measurements
Prerequisites	None
Teaching methods	Lectures, Exercises, Lab exercises
Assessment methods	Written final exam (80%) and lab grade (20%)
Language of instruction	Greek
Recommended bibliography	[1] Balanis A. Constantine, *Κεραίες - Ανάλυση και Σχεδίαση*, ΣΤΕΛΛΑ ΠΑΡΙΚΟΥ & ΣΙΑ, 2005. [2] Kraus John D., *Κεραίες*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 1998. [3] Καψάλης Χ., Κωττής Π., *Κεραίες ασύρματες ζεύξεις*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2008. [4] Henry L. Bertoni, Διάδοση *ραδιοκυμάτων στα συστήματα ασύρματης επικοινωνίας,* ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ, 2008. [5] Αθανάσιος Κανάτας, Φίλιππος Κωνσταντίνου, Γεώργιος Πάντος, *Ασύρματες Επικοινωνίες*, ΚΑΝΑΤΑΣ ΑΘΑΝΑΣΙΟΣ, 2010.

Course title	**Automatic Control Systems**
Course code	Y4
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	7th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE224/

Hours per week	4 (2 hours theory, 2 hours exercises)
Instructor(s)	Nikolaos Fahantidis (Assistant Professor)
Course content	Fundamental concepts and problem areas. Representation of dynamic systems: Differential equation models. Transfer functions. Analysis of feedback control systems: Stability. Root-locus. Nyquist and Bode diagrams. Accuracy. Speed of response. Robustness and sensitivity. Synthesis of simple control systems: Specifications. PID-controllers. Lead-lag compensation. State space models. State feedback. Pole placement. Observers. Digitally implemented controllers.
Expected learning outcomes and competences to be acquired	After the course the student should be able to describe and explain how feedback mechanisms affect system properties such as stability, speed of response, precision, sensitivity and robustness. Furthermore, the student should be able to analyze and design feedback systems with respect to these properties.
Prerequisites	None.
Teaching methods	Lectures, exercises, lab assignments.
Assessment methods	Written final exam, lab assignments.
Language of instruction	Greek
Recommended bibliography	[1] Dorf Richard C., Bishop Robert H., *Σύγχρονα συστήματα αυτόματου ελέγχου*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2010. [2] Ogata K., *ΣΥΣΤΗΜΑΤΑ ΑΥΤΟΜΑΤΟΥ ΕΛΕΓΧΟΥ*, ΓΡΗΓΟΡΙΟΣ ΧΡΥΣΟΣΤΟΜΟΥ ΦΟΥΝΤΑΣ, 2011. [3] Shahian B., Savant J.C. JR., Hostetter G.H., Steafani T.R., *Συστήματα Αυτόματου Ελέγχου*, Εκδόσεις Επίκεντρο, 2012. [4] Βελώνη Αναστασία, *Συστήματα Αυτόματου Ελέγχου*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2011. [5] Rohrs Charles E.,Melsa James L.,Schultz Donald G., *Γραμμικά συστήματα αυτόματου ελέγχου*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 1996. [6] Golnaraghi F., *Συστήματα Αυτομάτου Ελέγχου*, ΣΤΕΛΛΑ ΠΑΡΙΚΟΥ & ΣΙΑ, 2010.

8th SEMESTER

Course title	**Mobile Communication Networks**
Course code	Y5
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE202/
Hours per week	4
Instructor(s)	Nestoras Hadjidiamantis (Adjunct Lecturer)
Course content	Basic principles. Propagation and Interference. Cellular Systems Architecture. 2G, 2.5G, 3G, 4G Mobile Communication Systems. Basic functionalities and operations. Mobile Communication Systems Design. Resource Allocation. Radio-channel management. Mobility Management. Handover techniques. Signaling Systems.
Expected learning outcomes and competences to be acquired	The course objective is the comprehension and learning of the various mobile communication networking technologies. In this context, a wide range of issues are addressed, aiming to cover mobile communication networks and techniques for network design, development, management and evaluation.
Prerequisites	None
Teaching methods	The course is taught via lectures, while students actively participate. The lectures are supported with presentations in power point, which are available to the students via the asynchronous tele-education platform. Exercises are solved.
Assessment methods	Course assessment is conducted by written exams taking place at the middle and the end of the semester, including questions (both open and multiple choice) as well as exercises that cover the course content (30% and 70%, respectively).
Language of instruction	Greek

Recommended bibliography	[1] Μ. Θεολόγου, "Δίκτυα Κινητών και Προσωπικών Επικοινωνιών", 2η Έκδοση, 2010, Εκδόσεις Τζιόλα. [2] W. Stallings, "Ασύρματες Επικοινωνίες και Δίκτυα", 1η Έκδοση, 2007. Εκδόσεις Τζιόλα.

Course title	**Optical Communications and Networks**
Course code	Y6
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE199/
Hours per week	4
Instructor(s)	Panagiotis Sarigiannidis (Lecturer)
Course content	Waveguiding in Optical Fibers, Optical Fibers, Attenuation, Dispersion, Non Linear Effects, Generation and Reception of Optical Signals, Optical Transmitter and Receiver, Optical Amplifiers, WDM Optical Networks, Optical Switching and Routing in Access and Core Networks, Optical Burst Switching, Contemporary Optical Networks, Broadband Optical Networks, Passive Optical Networks, Hybrid Optical Wireless Optical Networks.
Expected learning outcomes and competences to be acquired	• to comprehend waveguiding in optical fibers. • to understand the optical technology and the optical fiber features. • to perceive and study the attenuation and dispersion phenomena. • to study and learn the main use of the optical transmitter, receiver, and repeater. • to study the modern optical networks. • to learn the main issues of the optical switching networks. • to learn and apply the main principles of the passive optical networks. • to be able to simulate and evaluate modern optical networks and communication links.
Prerequisites	None
Teaching methods	Lectures, Lab Tasks, Semester Project

Assessment methods	Written final exam (60%), Lab Tasks (30%), Project Presentation (10%)
Language of instruction	Greek
Recommended bibliography	[1] Green Paul, Δίκτυα οπτικών ινών, 978-960-7510-00-6, Εκδόσεις Α. Παπασωτηρίου, & ΣΙΑ ΟΕ, 1994. [2] G. I. Papadimitriou, P. A. Tsimoulas, M. S. Obaidat, A. S. Pomportsis, Οπτικά Δίκτυα Τεχνολογίας WDM: Τοπικά και Μητροπολιτικά Δίκτυα, 960-209-871-6, Εκδόσεις Κλειδάριθμος, ΕΠΕ. [3] G. Agrawal, Συστήματα Επικοινωνιών με Οπτικές Ίνες, Εκδόσεις Τζιόλα, 2011. [4] Ν. Ουζούνογλου, Τηλεπικοινωνίες Οπτικών Ινών, Εκδόσεις Συμεών, 1999. [5] B. Mukherjee, Optical WDM Networks (Optical Networks), Springer, 2006.

Course title	**Human-Computer Interaction**
Course code	Y7
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE220/
Hours per week	4 (2 hours theory, 2 hours lab)
Instructor(s)	Nikolaos Fahantidis (Assistant Professor)
Course content	Background - the development and scope of HCI. Practical goals. HCI relevant issues in human perception, memory and thinking processes. Approaches to designing information appliances - software objects and physical things. Design methodologies and notations - levels of interface design. Task analysis, grammars, state charts.

	Techniques and technologies--dialogue styles, information presentation, protocols for human-to-machine and machine-to-machine interactions; mobile computing, distributed wireless computation, wireless sensors. The design process - user involvement, iterative design, prototyping. Evaluation - methodologies, formative and summative. Performance analysis.
Expected learning outcomes and competences to be acquired	• Demonstrate, in writing, knowledge of the issues and problems in HCI. • Demonstrate an understanding of human perception and behaviour in analysing their interactions with technology in their every day lives. • Use established design principles and methodologies to solve HCI problems. • Acquire confidence in handling different disciplinary perspectives on HCI and the ability to apply them to design problems. • The ability to devise, plan and execute task analysis and system evaluation studies from an HCI perspective, and present findings in a clear and effective manner. • Demonstrate awareness of current areas of research by locating and summarising examples of recent progress.
Prerequisites	None
Teaching methods	Lectures, lab assignements.
Assessment methods	Project Assignments
Language of instruction	Greek
Recommended bibliography	[1] Shneiderman Ben, Plaisant Cathrerine, *Σχεδίαση Διεπαφής Χρήστη*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2010. [2] ΔΗΜΟΣΘΕΝΗΣ ΑΚΟΥΜΙΑΝΑΚΗΣ, *ΔΙΕΠΑΦΗ ΧΡΗΣΤΗ - ΥΠΟΛΟΓΙΣΤΗ: ΜΙΑ ΣΥΓΧΡΟΝΗ ΠΡΟΣΕΓΓΙΣΗ*, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ, 2006. [3] Interaction Design - Beyond Human-Computer Interaction 3e by Yvonne Rogers, Helen Sharp and Jenny Preece

Course title	**Computer and Network Security**
Course code	Y11

Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE198/
Hours per week	4
Instructor(s)	Panagiotis Sarigiannidis (Lecturer)
Course content	Security background, Threat analysis, Vulnerability points, Techniques on Cryptography, Symmetrical and unsymmetrical cryptography, Authentication, Digital signatures, Security providing protocols, IPSec, SSL, SSH, PGP, MIME, SET. Ports, TCP/IP security, Port scanning, Network security, Information system security, Databases security, Firewalls, Sniffing tools, Defense tools, Intruder Detection Systems (IDSs), OpenSSL, Certificates, Signatures, Security framework institution, Security standards, Security politics, Legal issues.
Expected learning outcomes and competences to be acquired	• to understand cryptographic techniques. • to study and perceive the main issues of Number Theory. • to learn and apply the well-known cryptographic algorithms. • to comprehend the terms of authentication and digital signature. • to design and implement computer and network security techniques (firewalls, sniffing, defense and security methodology, intrusion detection systems etc). • to interpret security frameworks. • to ensure anonymity and privacy. • to develop security environments. • to design security protocols and techniques. • to use and apply well-known security software in real-time.
Prerequisites	None
Teaching methods	Lectures, Labs, Lab Tasks, Semester Project
Assessment methods	Written final exam (60%), Lab Tasks (30%), Project Presentation (10%), Oral exam (∓20%)
Language of instruction	Greek
Recommended	[1] Γκρίτζαλης Στέφανος, Γκρίτζαλης Δημήτρης Α.,Κάτσικας

bibliography

Σωκράτης, Ασφάλεια Δικτύων Υπολογιστών, Εκδόσεις Α. Παπασωτηρίου & ΣΙΑ ΟΕ, 2003.

[2] William Stallings, Βασικές Αρχές Ασφαλείας Δικτύων: Εφαρμογές και Πρότυπα, Εκδόσεις Κλειδάριθμος, 2008.

[3] William Stallings, Κρυπτογραφία για Ασφάλεια Δικτύων, Αρχές και Εφαρμογές, Μαρία Παρίκου & ΣΙΑ, 2011.

9th SEMESTER

Course title	**Microwave Communications**
Course code	Y8
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	5th
Semester	9th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE213/
Hours per week	4
Instructor(s)	Lalas Antonios (Adjunct Lecturer)
Course content	Wave equation, Plane waves, Transmission lines (Circuit equivalent, Loaded transmission line, Smith chart), Waveguides (Rectangular, Cylindrical), Planar transmission lines (Dielectric slab waveguide, Stripline, Microstrip), Matching Networks (Circuit elements, Single and double stub tuners, λ/4 transformer), Analysis of microwave networks (Impedance matrix, Admittance matrix, Scattering matrix, Transmission matrix), 3- and 4-port devices (Circulators, Power dividers, Directional couplers, Isolators). Lab for microwave measurements based on the lab-volt measurement kit.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to: • Understand basic concepts of transmission lines • Understand operational concepts of waveguides • Categorize and utilize planar transmission lines • Utilize matching techniques depending on the application • Analyze the response of microwave networks • Categorize and utilize microwave devices • Design simple waveguide networks • Recognize real microwave systems and conduct measurements
Prerequisites	None
Teaching methods	Lectures, Exercises, Lab exercises
Assessment	Written final exam (80%) and lab grade (20%)

methods	
Language of instruction	Greek
Recommended bibliography	[1] Γιούλτσης Τραϊανός, Κριεζής Εμμανουήλ, *Μικροκύματα τόμος Ι*, ΕΚΔΟΤΙΚΟΣ ΟΙΚΟΣ ΑΔΕΛΦΩΝ ΚΥΡΙΑΚΙΔΗ, 2008. [2] Γιούλτσης Τραϊανός, Κριεζής Εμμανουήλ, *Μικροκύματα τόμος ΙΙ*, ΕΚΔΟΤΙΚΟΣ ΟΙΚΟΣ ΑΔΕΛΦΩΝ ΚΥΡΙΑΚΙΔΗ, 2008. [3] Pozar David M., *Μικροκυματική τεχνολογία*, ΣΤΕΛΛΑ ΠΑΡΙΚΟΥ & ΣΙΑ ΟΕ, 2004. [4] Collin Robert E., *Μικροκύματα*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2005. [5] Ουζούνογλου Νικόλαος Κ., *Εισαγωγή στα Μικροκύματα*, Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ, 1999.

Course title	**Bioinformatics**
Course code	Y9
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	5th
Semester	9th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE162/
Hours per week	4
Instructor(s)	Sofia Bellou (laboratory teaching staff)
Course content	Introduction to basic biological terms. Biomolecules DNA and RNA. Protein structure. Biological databases. Substitution matrices. Dynamic algorithms. Pair-wise sequence alignment. Multiple sequence alignment. Domains and motifs in biological molecules. Introduction to evolution theory. Phylogenetic analysis. Phylogenetic tree construction using UPMGA, Fitch-Margoliash & Neighbor-joining algorithms. DNA microarrays. Heuristic algorithms FASTA and BLAST.
Expected learning outcomes and competences to be acquired	The students at the end of semester should be familiar with informatics essential for biological data analysis. More specifically, the students should be able to retrieve, store, analyse and model biological information. In order to achieve this the understanding of algorithms used in bioinformatics for sequence comparison or

	phylogenetic tree construction becomes the main expected learning outcome of this module.
Prerequisites	None
Teaching methods	2 hr teaching and 2 hr laboratory exercises
Assessment methods	60% final exam 20% lab exam 20% short projects (6-7) during the semester
Language of instruction	Greek
Recommended bibliography	[1] Σοφία Κοσσιδά, ΒΙΟΠΛΗΡΟΦΟΡΙΚΗ, ΕΚΔΟΣΕΙΣ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΜΟΝ. ΕΠΕ, 2009. [2] NEIL C. JONES, PAVEL A. PEVZNER, ΕΙΣΑΓΩΓΗ ΣΤΟΥΣ ΑΛΓΟΡΙΘΜΟΥΣ ΒΙΟΠΛΗΡΟΦΟΡΙΚΗΣ, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ, 2010.

ELECTIVE COURSES, WINTER SEMESTERS

Course title	**Embedded Systems**
Course code	E33
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	5th
Semester	9th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE192/ & http://arch.icte.uowm.gr/courses/embedded/
Hours per week	4 (2 hours theory & 2 hours laboratory)
Instructor(s)	Minas Dasygenis (Lecturer)
Course content	Embedded Computing Principles. CPU instruction sets. Design, development and programming of digital embedded systems. Design requirements. Software and hardware analysis of typical embedded problems. Memory Hierarchy. Algorithmic transformations. Software and hardware application development. Real Time Operating Systems. Integration levels (vlsi, fpga, asic, asip). System Modeling using VHDL and UML. Performance and Power consumption optimization. Peripherals and interconnections. Embedded multiprocessor and accelerators. Input/Output Mechanisms. Interrupts. Exceptions. ARM Architecture. Laboratory assignments in assembly language programming and C for popular embedded processors and micro-controllers and VHDL for System-On-chip design.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: • the embedded systems and their specific requirements, • the economics of the embedded system design, • the interconnection networks, • the hardware software codesign, • the hardware accelerators, • the popular embedded systems architecture and organization, • the real time operating systems,

	• the hard and soft deadlines, • the performance of the embedded systems, • the input/output mechanisms, • the fundamental peripherals of an embedded system. From the laboratory assignments, students will gain the abilities to: • create and program embedded systems, according to the design requirements, • program micro-controllers and peripherals (arduino & shields), • understand the flexibility of the FPGA and utilize it in projects of embedded systems, • create and optimize applications in terms of low power consumption and high performance, • familiarize themselves with the ARM and TI integrated development environments, • fully utilize the VHDL to describe modules of embedded systems, • use the FPGA for application development, • design an embedded system using soft-cores, • design a system-on-chip (SoC), • master the DTSE methodology for application optimization, • use and glue together multiple intellectual property cores, • co-design hardware (VHDL) and software (C).
Prerequisites	Computer Architecture, Digital Design (not compulsory)
Teaching methods	Lectures, Powerpoint slides, Lecture Notes, in class quizzes, e-class, automated examination system i-exams, opencourses video lectures, laboratory exercises, semester group project.
Assessment methods	Written final theory & laboratory exam 40%, 12 weekly laboratory exercises 30%, 1 semester team project 30%.
Language of instruction	Greek
Recommended bibliography	[1] Οι Υπολογιστές ως Συστατικά Στοιχεία, Wayne Wolf (https://service.eudoxus.gr/search/#a/id:3409/0) [2] [64314]: Ψηφιακή Σχεδίαση με VHDL, Peter J Ashenden (https://service.eudoxus.gr/search/#a/id:64314/0) [3] [22758441]: Computer Architecture, McLoughli (https://service.eudoxus.gr/search/#a/id:22758441/0) [4] [22762722]: Embedded Systems Hardware for Software Engineers, Lipiansky (https://service.eudoxus.gr/search/#a/id:22762722/0)

	[5] [33094780]: Computer Organization and embedded systems, Hamacher C, Vranesc Z., Zaky S., Manjikian N. (https://service.eudoxus.gr/search/#a/id:33094780/0)

Course title	**e-Health**
Course code	E2
Course type	Elective
Course level	Undergraduate
Year of studies	4^{th}, 5^{th}
Semester	7^{th}, 9^{th}
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE128/
Hours per week	4
Instructor(s)	
Course content	Introduction to e-Health. Definition & value of e-Health. Main research and policy issues related to the application of informatics in medical care. Overview of basic tools, e.g. electronic patient records and decision support systems. Management of medical data. Web-based medical care. Online supply and demand of medical information. Medical consultation through internet (like e-therapy) and p2p virtual medical societies. The usage of search engines and internet in clinical trials. eHealth services and applications. Mobile and wireless communication in healthcare. Privacy and confidentiality in healthcare. Ethical issues.
Expected learning outcomes and competences to be acquired	The goal of this module is the students to become familiar with the growing area of e-Health, which is the application of informatics and telecommunications to support prevention, treatment and care quality. Due to the multi-disciplinary character of this module, students are exposed to information from different scientific areas, such as biology and medicine and the use of advanced laboratory equipment and software. During the semester novel approaches in the area of e-Helath are analyzed, such as e-wellness, independent living, Health 2.0, mhealth apps.
Prerequisites	None
Teaching methods	2 hr teaching and 2 hr laboratory exercises

Assessment methods	30% final exams 30% lab exams 40% semester project
Language of instruction	Greek
Recommended bibliography	[1] ΠΑΝΤΕΛΗΣ ΑΓΓΕΛΙΔΗΣ, Ιατρική Πληροφορική τόμος Α, "σοφία", 2011. [2] Αθηνά Λαζακίδου, Προηγμένα Συστήματα και Υπηρεσίες Πληροφορικής στο Χώρο της Υγείας, ΑΘΗΝΑ ΛΑΖΑΚΙΔΟΥ, 2009.

Course title	**Next Generation Networks and Services**
Course code	E3
Course type	Compulsory
Course level	Undergraduate (first cycle)
Year of studies	4^{th}-5^{th}
Semester	7^{th}-9^{th}
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE173/
Hours per week	4
Instructor(s)	
Course content	Next Generation Networks and Services. Research Issues and Challenges. Architectural Frameworks, Protocols, Standards. Heterogeneous Networks. Access networks and services. xDSL, FTTx, WiMAX, LTE, LTE-Advanced, small cell networks, ad-hoc networks, wireless sensor networks, B3G/4G/5G. Mobility Management. Always Best Connectivity Principle. Service Creation and Provisioning (IN, DPE, TINA, Parlay OSA, CAMEL, IMS, SIP). Network and Service Management. Context aware networks and services, self-organizing networks, autonomous and cognitive networks, cooperative networks, overlay networks, peer networks, social networking, future internet, internet of things, opportunistic networks, content dissemination networks. Service configuration. Ubiquitous and personalized services.

Expected learning outcomes and competences to be acquired	The course objective is the presentation of the latest developments and the state of the art solutions in the field of next generation networks and services. In this context, a wide range of issues are addressed, aiming to cover technologies, techniques and methods that could be adopted for the design, development, management and evaluation of next generation networks and creation, provisioning and management of services. Research challenges and issues that should be addressed are indicated, while potential solutions are highlighted. The students actively participate, while their research activity is reinforced. During the semester they study and present research papers from related literature and conduct a survey on a selected topic.
Prerequisites	None
Teaching methods	The course is taught via lectures, while students actively participate. The lectures are supported with presentations in power point, which are available to the students via the asynchronous tele-education platform. During the semester, students study and present papers from related research literature. Additionally, students write and present a survey on a selected topic.
Assessment methods	Course assessment is conducted by: a) written exams taking place at the end of the semester, including questions (both open and multiple choice) as well as exercises that cover the course content (30%), b) presentation of papers from related research literature (30%) and c) writing and presentation of a survey on a selected topic (40%).
Language of instruction	Greek
Recommended bibliography	[1] Χ. Βασιλόπουλος, Δ. Κωτούλας, Δ. Ξενικός, Π. Βούδδας, Γ. Χελιώτης, Γ. Αγαπίου, Τ. Δούκογλου, "Δίκτυα Πρόσβασης Νέας Γενιάς", Εκδόσεις Κλειδάριθμος, 2010. [2] A. Jeffrey, G. Ghosh, A. Muhamed, K. Τσουκάτος, "Βασικές αρχές WiMAX", Εκδόσεις Παπασωτηρίου, 2010. [3] J. L. Salina, P. Salina, "Next Generation Networks: Perspectives and Potentials", John Wiley & Sons, 2007. [4] "Towards 4G Technologies: Services with Initiative", Edited by H. Berndt, John Wiley & Sons, 2008. [5] "Service Provision: Technologies for Next Generation Communications", Edited by K. J. Turner, E. H. Magill, D. J. Marples, John Wiley & Sons, 2004. [6] "Next Generation Telecommunications Networks, Services, and

Management", Edited by T. Plevyak, Veli Sahin, IEEE Press, 2010.
[7] "Network Convergence: Services, Applications, Transport and Operations Support", Edited by H. Hanrahan, John Wiley & Sons, 2007.

Course title	**Robotics**
Course code	E4
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th, 5th
Semester	7th, 9th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE210/
Hours per week	4 (1 hour theory, 1 hour exercises, 2 hours lab).
Instructor(s)	Nikolaos Fahantidis (Assistant Professor)
Course content	An introduction to the kinematics of robot manipulators, robotic vision, sensing and the programming of robots. The course will cover forward and inverse kinematics of serial chain manipulators. Trajectory generation, collision avoidance, automatic planning of fine and gross motion strategies; robot programming languages. Proximity, tactile and force sensing. Biological analogies and medical applications of robotics.
Expected learning outcomes and competences to be acquired	The goal of this course is to provide a unified introduction to the area of robotics for advanced undergraduates and beginning graduate students. This course provides a broad exposure to the subject. A key aspect of the course is design and implement robotic systems. For students interested in further work in robotics, this course provides a useful introduction to more specialized graduate courses.
Prerequisites	None
Teaching methods	Lectures, exercises, las assignments.
Assessment methods	Examinations, Project Assignments
Language of instruction	Greek

Recommended bibliography	[1] Δουλγέρη Ζωή, «*Ρομποτική. Κινηματική, Δυναμική και Έλεγχος Αρθρωτών Βραχιόνων*», ΕΚΔΟΣΕΙΣ ΚΡΙΤΙΚΗ Α.Ε. (Σελίδες: 232). [2] Τζαφέστας, Σπύρος Γ., «*Ρομποτική. Τομ. 1: Ανάλυση και έλεγχος*» (629.892 TZA). [3] Craig John J. "*Εισαγωγή στη Ρομποτική Μηχανική και Αυτόματος Έλεγχος*", Εκδόσεις Τζιόλα, 2009. [4] Εμίρης Δημήτριος, «*Ρομποτική*», Εκδόσεις Άνωση, 1999. [5] B. Siciliano et al., "*Robotics: modelling, planning and control*", Springer, 2009. [6] Yoshikawa, Tsuneo, "*Foundations of robotics: analysis and control*," The MIT Press, 1990. (629.892 YOS). [7] Asada, H., Slotine, J.-J., "*Robot Analysis and Control*," John Wiley & Sons, 1986. [8] Craig, John J., "*Introduction to robotics: mechanics and control*," Addison- Wesley, 1989. (629.892 CRA). [9] Schilling, Robert J., "*Fundamentals of robotics: analysis and control*," Prentice Hall, 1990. (629.892 SCH). [10] K. S. Fu, R. C. Gonzalez, G. S. G. Lee, "*Robotics: control, sensing, vision, and intelligence*," McGraw-Hill, 1987. (629.892 FU).

Course title	**Microtechnology and Nanotechnology**
Course code	E5
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4^{th}, 5^{th}
Semester	7^{th}, 9^{th}
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE170/
Hours per week	4
Instructor(s)	Sotiria Psoma (Laboratory Teaching Staff)
Course content	• Introduction to Microtechnology and Nanotechnology. • Background on micro and nano scales. • The special tip of the nano - scale to the development of science. • Machines, tools and instruments used in nano - sciences. • Technology integrated circuit fabrication processes to clean and

	high quality workshops. • Advanced applications Microtechnology and Nanotechnology (Biology, Medicine, BioMEMS, Space, Environment, Communications, Electronics and Sensors, Energy and Materials) . • Examples of applications in Nanoelectronics and reference to the latest research developments such as organic electronics and graphene. • Legislation in Nanotechnology (Nanotoxicity/Public Policy). • Report on future developments and applications of Nanotechnology.
Expected learning outcomes and competences to be acquired	This course provides a general microtechnology-nanotechnology overview with sections on all the main areas The basics are covered to familiarise the student with the terms, concepts and tools most used in microtechnology and nanoscience/ nanotechnology researchers and engineers. By describing some of the discoveries can change the students understanding of how things work in micro-nano scale and can focus their own creative energy towards tackling important science and engineering questions for continuation of their studies at postgraduate level.
Prerequisites	None
Teaching methods	Lectures, Preparation of three homework assignments including a PowerPoint Presentations in the class (around 25 slides) and a Written Assignment Report of about 2.500 words for each exercise. Selected Laboratory Exercises.
Assessment methods	• Presentation (20-25 slides and delivery of a written assignment report (2500 words) for three tasks with different themes. • Final Course Grade (100%): Final written examination theory (necessary to achieve at least 5 (the base) in order to pass the module) = 40% and Average Grade of the Report Assignments = 60%
Language of instruction	Greek
Recommended bibliography	[1] Hanson George W., Αρχές Νανοηλεκτρονικής, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2009. [2] Williams Linda and Adams Wade, Nanotechnology Demystified, Εκδόσεις Επίκεντρο, 2006. [3] Παπασπυρίδης Κ, Παυλίδου Σ, Νανοτεχνολογία και προηγμένα πολυμερικά υλικά, ΑΡΗΣ ΣΥΜΕΩΝ, 2012. [4] Jeremy Rasden, Nanotechnology: An Introduction, Published by Elsevier Inc., 2011.

Course title	**Quality Control**
Course code	E6
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th, 5th
Semester	7th, 9th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH167/
Hours per week	4
Instructor(s)	George Nenes (Assistant Professor)
Course content	Introduction: brief history of quality methodology, quality management, quality costs, methods for quality improvement. Acceptance sampling: lot-by-lot acceptance sampling for attributes, single, double and multiple sampling plans, statistical and economic design. Statistical Process Control: capability analysis, control charts for attributes and variables, statistical and economic design. Planning, organizing and developing quality systems for industry.
Expected learning outcomes and competences to be acquired	The course presents systematically the modern methods of quality assurance placing special emphasis on the techniques of Statistical Quality Control (SQC). After the completion of the course the students should be able to handle and solve problems related to control and assurance of quality of products and processes by means of scientifically rigorous quantitative methods.
Prerequisites	Statistics
Teaching methods	Hours of Instruction 52 (Theory: 26, Exercises: 26)
Assessment methods	Final written exam (compulsory) , Intermediate written exam (optional)
Language of instruction	Greek
Recommended bibliography	[1] Statistical Quality Control, G. N. Tagaras. Zitis Publ., 2001. [2] Management and Statistical Quality Control, Ch. Kitsos, *Newtech Publ.*, 2003

Course title	**Technology, Research, Innovation Policies and Entrepreneurship**
Course code	E7
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th, 5th
Semester	7th, 9th
ECTS Credits	5
URL	http://elearn.materlab.eu/course/view.php?id=8
Hours per week	4
Instructor(s)	Yiannis Bakouros (Professor)
Course content	National Policies of research and technological growth –National policies of innovation –European map of research and technological growth –Models of policies of research and growth –Models of policies of innovation –Analysis of case studies. Study and Development of Business Plan.
Expected learning outcomes and competences to be acquired	Aim of course is το make students understand the significances of policies of Innovation, Research and Technological Growth. Emphasis is given in the policies in regional, national and European level. Examples- case studies from pilot regions and National Innovation Systems are studied.
Prerequisites	
Teaching methods	Lectures (13 wks x 4 hrs theory) and two obligatory homework projects.
Assessment methods	30% final oral exam, 70% two homework projects
Language of instruction	Greek
Recommended bibliography	E. Carayiannis, Y.L Bakouros, “Innovation and Entrepreneurship: Theory and Practice”, 2010

Course title	**Engineering and feasibility study**
Course code	E8
Course type	Elective

Course level	Undergraduate (third cycle)
Year of studies	4th, 5th
Semester	7th, 9th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH163/
Hours per week	4
Instructor(s)	George Skodras (Associate Professor)
Course content	Principles and methodology of financial analysis of industrial plants. Design and optimization methodology. Evaluation indices. Engineering and financial evaluation of investment plans. Design and time scheduling. Methodology of feasibility studies and financial analysis of investments.
Expected learning outcomes and competences to be acquired	The course presents systematically the design and optimization of industrial plants, as well as the preparation of feasibility studies. After the completion the students will be able to approach effectively the issues of the financial and engineering evaluation of industrial plants and to handle design and optimization problems, by means of scientifically rigorous quantitative methods.
Prerequisites	Thermodynamics, Mathematics, Statistics, Steam generators, Engineering and energy legislation
Teaching methods	Hours of Instruction 52 (Theory: 26, Exercises: 26) & Three home works (3)
Assessment methods	Final written exam (compulsory), three home works (compulsory)
Language of instruction	Greek
Recommended bibliography	[1] Σχεδιασμός και οικονομική ανάλυση εγκαταστάσεων για μηχανικούς, 3rd edition, McGraw Hill, M. Peters, K. Timmerhaus, R. West

Course title	**Queuing Theory**
Course code	E9
Course type	Elective

Course level	Undergraduate (first cycle)
Year of studies	4th, 5th
Semester	7th, 9th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE176/
Hours per week	4
Instructor(s)	Panagiotis Sarigiannidis (Lecturer)
Course content	An Introduction to Queues and Queueing Theory. Study and Evaluation Techniques for Queueing Systems, Telecommunication and Computational Model Systems. Little's Law. Basic Queueing Theory - I (Analysis of M/M/-/- Type Queues), Basic Queueing Theory - II (Departures, Method of Stages, Batch Arrivals), Birth-Death Processes. Analysis of the simple M/M/1 and M/G/1 Queue. M/M/1/N Queues and Multi-Server Systems : M/M/m, M/M/m/K, M/M/m/m (Erlang – B). Applications and Simulation to Packet Scheduling in High-Speed Networks and Modern Wireless Networks.
Expected learning outcomes and competences to be acquired	• to understand of the aims, use, and functionality of queuing systems. • to perceive and utilize the Little's Law. • to comprehend the discrete and continuous time Marcov Chains. • to perceive the use and functionality of the birth-death model. • to analyze and resolve M/M/-/- queuing systems. • to analyze and resolve multiple-server and generic queueing systems. • to develop simulation programs in order to study and evaluate various queuing systems. • to apply and implement queuing systems in the context of modern communication networking.
Prerequisites	None
Teaching methods	Lectures, Programming Tasks
Assessment methods	Written final exam (70%), Programming Tasks (30%)
Language of instruction	Greek
Recommended bibliography	[1] Δ. Φακίνος, Ουρές Αναμονής, Εκδόσεις Συμμετρία, 2008. [2] Ι. Τρύφων, Π. Δάρας, Θ. Συψάς, Στοχαστικές Ανελίξεις, Εκδόσεις

Ζήτη, 2003.
[3] Χούχουλας, Θεωρία Αναμονής, Εκδόσεις Συμμετρία, 2008.
[4] Κοκολάκης Σπηλιώτης, Θεωρία Πιθανοτήτων και Στατιστική με Εφαρμογές, Εκδόσεις Συμεών, 2010.
[5] L.Kleinrock, "Queueing systems; volume 1: theory", J. Wiley & Sons, New York, 1975.
[6] R.Wolf, "Stochastic modelling and the theory of queues", Prentice-Hall, Englewood Cliffs, NJ, 1989.
[7] A. Allen, "Probability Statistics and Queuing Theory with Computer Science Applications, second edition, Academic Press Inc., 1990.
[8] NG. Chee-Hock, S. Boon-Hee, Queuing Modelling Fundamentals With Applications in Communication Networks, second edition, Wiley, 2008.

Course title	**Complexity theory**
Course code	E10
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4^{th} , 5^{th}
Semester	7^{th} , 9^{th}
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE160/
Hours per week	4
Instructor(s)	A. Bisbas (Adjunct Lecturer)
Course content	Problems, algorithms and computational complexity. Turing machines, Non-deterministic Turing machines. Global Turing machines. The position of Church. Recursive functions, computability and incomputability, time and space bounded computation, retrospective and back countable languages, deterministic and non-deterministic time classes and space classes, LOGSPACE, NL, P, NP, PSPACE, etc; Cook-Levin theorem
Expected learning outcomes and competences to be acquired	• to understand and design Turing Machines • to understand Church's position • to study and perceive computability and incomputability issues • to comprehend the terms of time and space bounded

	computation • to study and perceive deterministic time and space classes • to study and perceive non-deterministic time and space classes • to comprehend the terms of NP, P, NL, PSPACE
Prerequisites	None
Teaching methods	Lectures, Notes, Exercises
Assessment methods	Assignment (30% of the total mark) and exams (70% of the total mark)
Language of instruction	Greek
Recommended bibliography	[1] SIPSER MICHAEL, ΕΙΣΑΓΩΓΗ ΣΤΗ ΘΕΩΡΙΑ ΥΠΟΛΟΓΙΣΜΟΥ, ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, 2009 [2] Lewis Harry R.,Παπαδημητρίου Χρίστος Χ., Στοιχεία θεωρίας υπολογισμού, ΕΚΔΟΣΕΙΣ ΚΡΙΤΙΚΗ, 2005

Course title	**Data Mining**
Course code	E11
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4^{th}, 5^{th}
Semester	7^{th}, 9^{th}
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE204/
Hours per week	4
Instructor(s)	P. Karvelis (Adjunct Lecturer)
Course content	Introduction to Data Mining Techniques: data, problems, applications. Data preprocessing: cleaning, transformation, methods for dimension reduction. Clustering: introduction, distances, k-means, hierarchical clustering. Association Rules: problem definition, the a-priori algorithm, the FP-Growth algorithm, evaluation of association rules. Classification: introduction, decision trees, over-fitting, missing values, rule-based classifiers, k-nearest neighbors. Methods for finding associations in multi-dimensional data and relational data.

Expected learning outcomes and competences to be acquired	Data Mining Fundamentals Pre-processing data Data Mining Techniques: - Classification - Clustering - Association Rules Using Weka
Prerequisites	None
Teaching methods	Lectures and labs
Assessment methods	Assignment (40% of the total mark) and exams (60% of the total mark)
Language of instruction	Greek
Recommended bibliography	[1] Michael Vazirgiannis, Chalkidi Maria, Mining knowledge from databases and the web, G. DARDANOS - DARDANOS K., 2005. [2] Tan Pang - Ning, Steinbach Michael, Kumar Vipin, Introduction to data mining, A. Tziola & Sons PUBLICATIONS, 2010. [3] Margaret H. Dunham, DATA MINING, NEW TECHNOLOGIES PUBLICATIONS Ltd., 2004.

Course title	**Microprocessors**
Course code	E22
Course type	Elective course - (Non Compulsory)
Course level	Undergraduate (first cycle)
Year of studies	4^{th} ,5^{th}
Semester	7^{th}, 9^{th}
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE243/
Hours per week	4 (2 hours theory & 2 hours laboratory)
Instructor(s)	Sotirios Kontogiannis (Adjunct Lecturer)
Course content	Introduction to microprocessor systems, starting with micro-controllers of the AVR architecture, micro-controllers structure/memory/I/O/Interrupts and AVR assembly programming,

	followed by ARM BCM2835 microprocessor architecture, programming and Interfacing with the use of the GPIO port.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: • the AVR micro-controllers and 32 bit ARM microprocessors, • assembly programming for the AVR architecture and specifically for the Atmega328P micro controller, • C programming for Atmega328P, • ARM microprocessor internals (32 bit BCM2835 microprocessor), • ARM microprocessor programming and I/O programming • the peripheral interconnection to the CPU, • the data buses, • the memory operations, • the CPU control using assembly instructions From the laboratory assignments, students will gain the abilities to: • AVR assembly programming, • understand the benefits and drawbacks of using assembly language, • develop assembly programs, • understand AVR assembly constructs, • understand input/output techniques for AVR micro-controllers and arm microprocessors • understand how to cross compile for the arm architecture, • use AVR interrupts and arm system calls manipulation, • ARM programming and I/O of the GPIO interface using wiringPi tools.
Prerequisites	• Digital Design • Embedded Systems (not compulsory)
Teaching methods	Lectures, Powerpoint slides, Lecture Notes, in class, laboratory exercises, semester group project.
Assessment methods	Written final theory exam 60%, final lab exam 40%, 1 semester team project 100% .
Language of instruction	Greek
Recommended bibliography	[1] Ενσωματωμένα Συστήματα. Ο Μικροελεγκτής AVR (Αρχιτεκτονική, Προγραμματισμός, Εφαρμογές. Atmel ATmega8515) . , Πογαρίδης Δ., Εκδοτικός Όμιλος ΙΩΝ ,ISBN 978-960-508-080-8.

	[2] Σχεδίαση Συστημάτων Μικροϋπολογιστών (Αρχιτεκτονική, Προγραμματισμός, Εφαρμογές. MC68000), Πογαρίδης Δ., Εκδοτικός Όμιλος ΙΩΝ ,ISBN 978-960-508-082-2.

Course title	**Advanced Digital Design Techniques**
Course code	E23
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th, 5th
Semester	7th, 9th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE245/
Hours per week	4 (2 hours theory &2 hours laboratory)
Instructor(s)	Filippos Sofos (Adjunct Lecturer)
Course content	Hardware Description Languages. VHDL language, behavioral and structural levels. Advanced digital systems design with VHDL. Memory and microprocessor design. Synthesis. Reconfigurable array programming (FPGAs – CPLDs). Use of embedded cores, systems on chip (SoC). Programming of embedded cores. SystemVerilog hardware description language for SoC design. Lab classes on VHDL, programming and communication with programmable/reconfigurable devices.
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: • Hardware description language importance, • Increase productivity with HDLs, • Design flow with VHDL in reprogrammable/reconfigurable logic, • Correct use of VHDL in digital design, • The system in a system-on-chip design, • Core programming in an FPGA, • Modern applications of SystemVerilog. From the laboratory assignments, students will gain the abilities to: • Understand advantages of VHDL over schematic design,

- Write and compile programs in VHDL,
- Correctly use most of VHDL commands,
- Apply logic simulation of digital systems,
- Learn synthesis implications in FPGAs and CPLDs,
- Estimate timing delays in hardware,
- Apply the design in a real FPGA and/or CPLD,
- Communicate with reprogrammable hardware.

Prerequisites	Digital Design (not compulsory)
Teaching methods	Lectures, Powerpoint slides, Lecture Notes, in-class quizzes, e-class, laboratory exercises, weekly lab projects, semester group project.
Assessment methods	Written final theory exam 40%, 12 weekly laboratory projects 30%, 1 semester team project 30%.
Language of instruction	Greek
Recommended bibliography	[1] Peter J Ashenden, Ψηφιακή Σχεδίαση με VHDL, Έκδοση: 1η/2010, ΕΚΔΟΣΕΙΣ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΜΟΝ. ΕΠΕ ISBN: 978-960-6759-505, Κωδικός Βιβλίου στον Εύδοξο: 64314 [2] VOLNEI A. PEDRONI, Σχεδιασμός κυκλωμάτων με τη VHDL, Έκδοση: 1η/2008, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, ISBN: 978-960-461-118-8, Κωδικός Βιβλίου στον Εύδοξο: 13901 [3] Brown, Vranesic , Σχεδίαση Ψηφιακών Συστημάτων με τη Γλώσσα VHDL, Έκδοση: 3η Έκδοση/2011, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., ISBN: 978-960-418-340-1, Κωδικός Βιβλίου στον Εύδοξο: 18548944

Course title	**Mobile Computing**
Course code	E24
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4^{th}, 5^{th}
Semester	7^{th}, 9^{th}
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE238/

Hours per week	4
Instructor(s)	Nikolaos Dimokas (Adjunct Lecturer)
Course content	Theoretical part: • Introduction to mobile computing and reference to relatives concepts (ubiquitous computing, pervasive computing), • Architectures, hardware, devices and infrastructure of mobile computing, • Protocols for personal communication and mobile networks, broadcast disks and broadcast on demand policies, • caching and prefetching in mobile nodes. Cache consistency with broadcasting timestamps and bit-sequences. Cache replacement and cache consistency policies. • Indexes for uniform and skew access pattern, • Clustering algorithms for mobile ad hoc networks, • Routing, geographical routing and data dissemination, • Operating systems and platforms about mobile devices, • Mobile computing services, location based services, • Programming of mobile devices, principles and design patterns. Laboratory part: • Demonstration of mobile applications and development tools (Eclipse Android Developer Tools), • Implementation of mobile applications with Android system, • Exercises
Expected learning outcomes and competences to be acquired	Upon successful completion of this course, students will be able to: • understand and use the basic principles of mobile computing, • understand issues related to communication, clustering and routing protocols for mobile ad hoc networks, • understand issues related to data management like caching and cache consistency in mobile networks, • understand and use operating systems and platforms for mobile devices, • understand and use mobile computing services, location based services, • understand and use the basic design principles of mobile applications, • understand issues related to programming of mobile devices, • develop mobile applications for Android platform.
Prerequisites	None
Teaching methods	Lectures, Labs, Projects

Assessment methods	Written final exam (60%), Projects (40%)
Language of instruction	Greek
Recommended bibliography	[1] Θεολόγου Μ., *Δίκτυα κινητών και προσωπικών επικοινωνιών*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2η έκδ./2010. [2] Conder, Shane, Darcey, Lauren, *Ανάπτυξη εφαρμογών με το Android*, Γκιούρδας Μ., 2η έκδ./2011. [3] Stallings William, *Ασύρματες επικοινωνίες και δίκτυα*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 1η έκδ./2007.

Course title	**Electric Power Systems**
Course code	E25
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4^{th}, 5^{th}
Semester	7^{th}, 9^{th}
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE239/
Hours per week	4
Instructor(s)	Theodoros Theodoulidis (Professor)
Course content	The production-transmission-power distribution system. Three phase systems, transformers, synchronous generators, overhead lines. Power-frequency control, voltage-reactive power Modeling of transmission lines, compensation, stability. Power flow and network errors. Economic operation of EPS.
Expected learning outcomes and competences to be acquired	After the successful completion of the course, students should: 1)Be able to do basic calculations regarding the main components that make up an EPS, ie the generator, the transformer and the transmission line. 2) Be able to select the appropriate electrotechnical model and to solve it for a given transmission line (calculating voltages, currents, power depending on its length). 3) Be able to deal with symmetric (using equivalent single phase) and asymmetric triphasic systems (using symmetric components).

	4) Have acquired basic knowledge of ac networks, HVDC networks, and on economic operation and load forecasting at country level.
Prerequisites	
Teaching methods	Lectures, exercises.
Assessment methods	Final written exam (100%)
Language of instruction	Greek
Recommended bibliography	[1] Συστήματα ηλεκτρικής ενέργειας, Μαλατέστας Παντελής, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2013. [2] Συστήματα Ηλεκτρικής Ισχύος, Nasar Syed A., ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2002. [3] Εισαγωγή στα συστήματα ηλεκτρικής ενέργειας, Βοβός Νικόλαος Α., Γιαννακόπουλος Γαβριήλ, Ζήτη Πελαγία & Σια, 2008.

Course title	**Thermodynamics**
Course code	E26
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4^{th}, 5^{th}
Semester	7^{th}, 9^{th}
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH153/
Hours per week	5
Instructor(s)	Tomboulides Ananias (Professor)
Course content	Basic principles of Thermodynamics. The First Law of Thermodynamics in closed systems, properties of pure substances, Phase diagrams for gases and liquids, equations of State, the First Law of Thermodynamics for open flowing systems, The Second Law of Thermodynamics, Entropy and the third Law, Power, refridgeratıon and heating cycles, Gas and vapor cycles: Carnot, Otto, Diesel, Brayton, Rankine.
Expected	Course focuses on the understanding of the fundamental concepts

learning outcomes and competences to be acquired	and principles in thermodynamics with emphasis on the solution of engineering problems and on the analysis of energy systems and flow processes.
Prerequisites	Mathematics I, Mathematics II, Physics
Teaching methods	Oral presentations and exercises
Assessment methods	Written exam, 70% final exam, 30% midterm exam
Language of instruction	Greek
Recommended bibliography	[1] Thermodynamics: An Introduction to the Fundamentals and Applications, Hans Dieter Baehr, 2011 [2] Thermodynamics, An Engineering Approach, 3rd edition, Dr. Y. Cengel, Dr. M. Boles [3] Fundamentals of Engineering Thermodynamics, M. J. Moran, H. N. Shapiro

Course title	**Special Assignement**
Course code	E27
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th, 5th
Semester	7th, 9th
ECTS Credits	5
URL	eclass.uowm.gr/courses/ICTE246/
Hours per week	
Instructor(s)	Teaching Staff of the Department
Course content	Research-related assignment, based on a combination of knowledge acquired from previous semesters.
Expected learning outcomes and competences to be acquired	Through this work, the student becomes familiar with the research process, which is later intensified through the diploma thesis. The student acquires experience in conducting a literature search, combining different disciplines, applying theoretical knowledge and writing technical reports.

Prerequisites	None
Teaching methods	
Assessment methods	Final report
Language of instruction	Greek
Recommended bibliography	

ELECTIVE COURSES, SPRING SEMESTER

Course title	**Modeling and Optimization of Supply Chains**
Course code	E13
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH169/
Hours per week	4
Instructor(s)	George Nenes (Assistant Professor)
Course content	Introduction: The significant role of Inventory management and Logistics. Introduction to Supply Chain Management. Forecasting Methods. Deterministic systems of inventory management: (a) the case of known and constant demand (EOQ methods) and (b) the case of known and inconstant. Stochastic systems of inventory management: sQ, RS, sS, RsS systems. Seasonable and innovative products (Newsvendor problem). Supply Chain Management and multi-echelon inventory optimization.
Expected learning outcomes and competences to be acquired	Understanding of the terms Logistics and Supply Chain Management. Learning quantitative inventory management methods for the case of deterministic and stochastic demand. Solving numerical examples and problems with the application of the introduced quantitative methods. Development of critical skill to choose and apply the appropriate quantitative method depending on the case under study.
Prerequisites	Statistics
Teaching methods	Hours of Instruction 52 (Theory: 26, Exercises: 26)
Assessment methods	Final written exam (compulsory) , Intermediate written exam (optional)
Language of instruction	Greek
Recommended bibliography	[1] Logistics: A quantitative approach, Vidalis M, Kleidarithmos

Publ., Athens 2009.
[2] Production Planning, Pappis K, Stamoulis Publ., Athens 2006.
[3] Design and optimization of Supply Chain Management, Marinakis I, Mygdalas A, Sofia Publ., Thessaloniki 2008.
[4] Inventory Management and Production Planning and Scheduling, Silver EA, Pyke DF, Peterson R, John Wiley and Sons 3rd ed., New York 1998.

Course title	**Wireless Sensor Networks**
Course code	E14
Course type	Elective
Course level	Undergraduate
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	http://wsnlab.icte.uowm.gr/ http://eclass.uowm.gr/courses/ICTE165/
Hours per week	4
Instructor(s)	
Course content	The course aims to discuss recent achievements in the field of wireless sensor networks, including architecture, protocols and application scenarios. It covers the following topics: introduction to wireless sensor networks and their applications, characteristics and constrains, approaches of self- organization and routing algorithms, main programming issues and an overview of operating systems and middleware. The emphasis is given on environmental applications of telemetry and health-oriented sensor networks. The course is laboratory based and uses Micaz (TinyOS) nodes. A set of tasks and modules are being developed during the semester leading to a large project.
Expected learning outcomes and competences to be acquired	Recent achievements in electronics and telecommunications have facilitated the development of multi-functional sensor nodes (nodes), low-power and small-scale, that can freely communicate over short distances. These nodes can be connected together to form WSNs. Wireless sensor networks consist of a large number of nodes forming

	a multihop wireless network, connected to low power radio transceivers. Restrictions on nodes require different design and operation of wireless sensor networks compared with traditional wireless networks and require the development of new protocols and management methods.
Prerequisites	None
Teaching methods	2 hr teaching and 2 hr laboratory exercises
Assessment methods	30% final exam 70% semester projects
Language of instruction	Greeks
Recommended bibliography	Gardner Julian W., *Μικροαισθητήρες*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2000

Course title	**Biomedical Technology**
Course code	E15
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE149/
Hours per week	4
Instructor(s)	
Course content	Biomedical Engineering present and future. The cell, biomolecules, membranes, electrical potentials, Nerts – Plank equations, neurons, resting and action potentials. Biological signal processing. Heart physiology and Electrocardiography. Blood pressure. Brain Physiology and Electroencephalography. Electromyography. Introduction to Medical Imaging: Instrumentation and Measurements, X-Ray Computed Tomography (CT), Nuclear Medicine and tomography SPECT, Nuclear Magnetic Resonance (MRI), Ultrasonic Imaging.

Expected learning outcomes and competences to be acquired	The goal of this module is the students to become familiar with the growing area of biomedical technology, which is the application of basic science as physics and informatics and engineering to develop diagnostic and therapeutic technology. Due to the multi-disciplinary character of this module, students are exposed to information form different scientific areas, such as biological signal generation and their analysis, and the use of suitable laboratory equipment e.g. for biomedical signal capture, storage, transportation and analysis.
Prerequisites	None
Teaching methods	2 hr teaching and 2 hr laboratory exercises
Assessment methods	30% final exam 30% lab exam 40% semester project
Language of instruction	Greek
Recommended bibliography	[1] ΠΑΝΤΕΛΗΣ ΑΓΓΕΛΙΔΗΣ, Ιατρική Πληροφορική τόμος Α, "σοφία", 2011. [2] Κουτσούρης Διονύσης - Δημήτρης, Νικήτα Κωνσταντίνα Σ., Παυλόπουλος Σωτήρης Α., Ιατρικά απεικονιστικά συστήματα, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2005. [3] Σεργιάδης Γεώργιος Δ., Βιοϊατρική τεχνολογία, University Studio Press, 2009. [4] Κουτσούρης Διονύσης - Δημήτρης, Παυλόπουλος Σωτήρης Α., Πρέντζα Ανδριάνα Α., Εισαγωγή στη βιοϊατρική τεχνολογία και ανάλυση ιατρικών σημάτων, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2003.

Course title	**Digital Image Processing**
Course code	E17
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/ICTE236/

Hours per week	4 (2 hours lectures and 2 hours lab)
Instructor(s)	P. Karvelis (Adjunct Lecturer)
Course content	Introduction to image, binary images. Color models, Binary algorithms, image rotation, transformations, two-dimensional transformations: Walsh, Hadamard, Haar. Optimizing images: noise types in images, averaging filters, Gauss filters, high pass filtering, histogram modification technique. Image Segmentation. Determination of contours and limits. Fourier Descriptors. Hough Transformation. Feature Extraction. Edge detection: Kirsch method, Laplace operator, Marr and Hildreth methods. Applications in Matlab.
Expected learning outcomes and competences to be acquired	The purpose of this course for the students is to learn, to understand and to familiarize them with applied digital image processing technology through a practical approach. The course aims to cover topics including: • The mathematical foundations of image analysis. • The theory and applications of transformations in two dimensions. • The design and applications of digital filter. • The theory and applications of recovery and image coding. The above key elements of the analysis of digital signals will complete a description of more advanced applications such as decomposition, wavelets, etc. Particular emphasis will be given to the processing of Digital Medical Images. Teaching basic programming Matlab especially for medical image processing, will enable the student to make contact with real problems in the field of medical imaging, and will enable him to see advanced filtering techniques and locating in medical images. After completing the course the student will have acquired the necessary knowledge and skills to be able to understand key issues concerning the representation and manipulation of digital medical images, to understand the image processing methods in space and frequency domain and, finally, understand basic algorithms for medical image restoration.
Prerequisites	None.
Teaching methods	Lectures, lab exercises.
Assessment methods	

Language of instruction	Greek.
Recommended bibliography	[1] Παπαμάρκος Νικόλαος, *Ψηφιακή Επεξεργασία και Ανάλυση Εικόνας*, ΝΙΚΟΛΑΟΣ ΠΑΠΑΜΑΡΚΟΥ, 2010. [2] ΙΩΑΝΝΗΣ ΠΗΤΑΣ, *ΨΗΦΙΑΚΗ ΕΠΕΞΕΡΓΑΣΙΑ ΕΙΚΟΝΑΣ*, ΙΩΑΝΝΗΣ ΠΗΤΑΣ, 2010. [3] Gonzales, *Ψηφιακή Επεξεργασία Εικόνας*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2010.

Course title	**New & Renewable Energy Sources**
Course code	E18
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH132/
Hours per week	4
Instructor(s)	George Skodras (Associate Professor)
Course content	Introduction to energy policy issues. Energy in the European Union. The EU Green Bible for the security of the energy supply. The EU White Bible for the Renewable Energy Sources. Energy reserves and resources. The Greek energy system. Solar energy-basic principles. Solar collectors and photovoltaics. Wind energy and wind parks. Energy from biomass. Energy utilization of biomass. Hydropower and power plants – Advantages and disadvantages. Geothermal energy and geothermal fields. Tidal and wave energy. Ocean thermal energy. Energy conservation. Thermodynamic analysis of the renewable energy systems. Environmental analysis of the renewable energy systems. Social and economic impacts.
Expected learning outcomes and competences to be acquired	The course presents systematically the renewable energy sources the systems and the cutting edge developments. After the completion the students will be able to approach effectively the issues of RES and to handle design and implementation problems, by means of scientifically rigorous quantitative methods.

Prerequisites	Thermodynamics, Mathematics, Statistics
Teaching methods	Hours of Instruction 52 (Theory: 26, Exercises: 26) – Home works 3
Assessment methods	Final written exam (compulsory), Intermediate written exam (optional)
Language of instruction	Greek
Recommended bibliography	[1] Ήπιες μορφές ενέργειας, Έκδοση 1η 2008, Παπαϊωάννου Γ. [2] Ήπιες μορφές ενέργειας, Έκδοση 1η 2008, Κανελλοπούλου Ελ. [3] Ήπιες μορφές ενέργειας Ι – Περιβάλλον και Ανανεώσιμες Πηγές Ενέργειας, Έκδοση 1η 2003, Καπλάνης Σ. [4] Ήπιες μορφές ενέργειας, Έκδοση 1η 2006, Κουτσούμπας Χρ. [5] Συμβατικές & Ήπιες μορφές ενέργειας, Έκδοση 1η 2006, Κ. Μπαλάρας, Α. Αργυρίου, Φ. Καραγιάννης

Course title	**Industrial Management**
Course code	E19
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH177/
Hours per week	5
Instructor(s)	Sofia Panagiotidou (Lecturer)
Course content	Introduction to production operations. Forecasting: time series and causal models; constant, linear-trend and seasonal models. Design of Production Systems: product design; process selection and capacity planning; facilities layout. Planning and Control of Production Systems: long, medium and short range production planning; inventory management; quality control; equipment maintenance and replacement.
Expected learning outcomes	After the completion of the course the students should be able to understand the role and interrelations of the main operations and

and competences to be acquired	decision making tools in production systems (such as inventory control, equipment maintenance, quality control, demand forecasting, production planning), and their interactions to the external environment.
Prerequisites	Statistics, Operations Research
Teaching methods	Hours of Instruction 65 (Theory: 39, Exercises: 26)
Assessment methods	Final written exam (compulsory), Intermediate written exam and/or assignments (optional)
Language of instruction	Greek
Recommended bibliography	[1] Management of Production Systems, S. G. Dimitriadis, A. N. Michiotis, Kritiki Publ., 2007. [2] Operations Management, J.K. Shim, J.G. Siegel, Kleidarithmos Publ., 2002.

Course title	**Simulation and System Dynamics**
Course code	E20
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH168/
Hours per week	4
Instructor(s)	George Nenes (Assistant Professor)
Course content	Design, analysis and development of simulation, random numbers, random numbers generators and simulation sampling, statistical analysis of simulation results. Applications in industrial management and operations research. Practice on specialized simulation software. Fundamental system concepts, the object of a system dynamics analysis.
Expected learning outcomes and competences	Knowledge of the terminology of discrete event simulation and continuous simulation. Ability to analyze a physical system and to develop a simulation model. Simulation model transformation using

to be acquired	simulation environments (programming languages). Ability of statistical analysis and explanation of simulation results.
Prerequisites	Statistics
Teaching methods	Hours of Instruction 52 (Theory: 26, Exercises: 26)
Assessment methods	4 Intermediate Written Assignments (compulsory)
Language of instruction	Greek
Recommended bibliography	[1] Simulation Techniques Theory & Applications, Roumeliotis, M., Souravlas, I.S., Tziola Publ., Thessaloniki 2012. [2] Theory of System Dynamics, Georgiadis, P., Sofia Publ., Thessaloniki 2006. [3] Simulation and Applications, Sfakianakis, M., Patakis Publ., Athens 2001. [4] Spreadsheet modeling and decision analysis, Ragsdale, C., South-Western Educational Publishing (3rd edition), 2000.

Course title	**Network Design, Operation, and Management**
Course code	E28
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	
Hours per week	4
Instructor(s)	
Course content	Basic network devices handling. Network configuration on data link and on network layer. Switching and routing entities. Switching configuration and customization. Virtual private network planning, configuration, and infrastructure. Routing configuration and customization. Local routing networks infrastructure. Routing algorithms support and operation. Access list handling. Wireless port

	and interface support. Point to point interconnections. Command support on Cisco OS and on Router OS. Network problem resolution and understanding.
Expected learning outcomes and competences to be acquired	• Network entities interconnection on switching layer. • Network entities interconnection on routing layer. • Network device configuration. • Virtual networking support. • Routing protocols operation and support. • Console command support in Cisco OS and Router OS platforms. • Wireless link interconnection and support. • Network problem resolution.
Prerequisites	Introduction to Telecommunications (1st Sem.), Telecommunication Networks (2nd Sem.), Computer Networks I (3rd Sem.), Computer Networks II (4th Sem.).
Teaching methods	Lectures, Labs, Lab Tasks
Assessment methods	Written final exam (60%), Lab Tasks (40%).
Language of instruction	Greek
Recommended bibliography	[1] Jim Doherty, Neil Anderson, Paul Della Maggiora, *Ο οδηγός της Cisco για τη δικτύωση*, Εκδόσεις Κλειδάριθμος, 2010. [2] Steve McQuerry, *CCNA Αυτοδιδασκαλία: Διασύνδεση Συσκευών Δικτύου Cisco (ICND)*, Εκδόσεις Κλειδάριθμος, 2006.

Course title	**Compilers**
Course code	E29
Course type	Elective
Course level	Undergraduate (1st cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	
Hours per week	4

Instructor(s)	Evaggelos Karvounis (Adjunct Lecturer)
Course content	Introduction, Block-structured languages, Static and dynamic scope, Functions and procedures, Scoping rules, Memory management, Lexical structure of programming languages, Lexical analysis, Code generators, Programming language syntax, Syntax analysis: top-down and bottom-up, Programming language semantics: axiomatic, denotational and operational semantics, Semantic analysis: attribute grammars and symbol table, Code generation/synthesis: intermediate code and machine code, Type systems, Type and data representation.
Expected learning outcomes and competences to be acquired	Learning Outcomes The students who will attend the course are expected to: • familiarize themselves with a critical approach in programming languages through the comparative analysis of their characteristics • understand the conflicting design options in programming languages and how they can affect their acceptance • understand the trends in the use of programming languages, in order to be prepared for new programming methods, paradigms and tools • know the whole design cycle of programming languages • gain experience in compiler construction General Competences: • Apply knowledge in practice • Adapt to new situations • Make decisions • Work autonomously • Work in teams • Be critical and self-critical • Advance free, creative and causative thinking
Prerequisites	Elements of the following course are required: • Complexity theory
Teaching methods	Lectures, exercises
Assessment methods	Written intermediate exam (25%), written final exam (75%).
Language of instruction	Greek
Recommended bibliography	[1] Κ. Λάζος, Π. Κατσαρός, Ζ. Καραϊσκος, "Μεταγλωττιστές Γλωσσών Προγραμματισμού: Θεωρία & Πράξη", 3η

έκδοση/2004, ISBN: 960-87723-4-6.
[2] M. L. Scott, "Πραγματολογία Γλωσσών Προγραμματισμού", 2η έκδοση/2009, Εκδόσεις Κλειδάριθμος, ISBN: 978-960-461-230-7.
[3] J. C. Mitchell, "Concepts in Programming Languages", 1st edition/2002, Cambridge University Press, ISBN: 978-0521780988.
[4] A. V. Aho, M. S. Lam, R. Sethi, J. D. Ullman, "Compilers: Principles, Techniques, and Tools", 2nd edition/2006, Addison Wesley, ISBN: 978-0321486813.
[5] R. W. Sebesta, "Concepts of Programming Languages", 10th edition/2012, Addison-Wesley, ISBN: 978-0131395312.

Course title	**VLSI Design**
Course code	E30
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	
Hours per week	4
Instructor(s)	
Course content	NMOS and PMOS transistor properties. Transistors as switches. Physical design. Logic gates latency, modeling and design optimization. Energy consumption, power optimization techniques. Gate design using transistors. Combinational circuits. Pass transistor logic gates and dynamic gates. Sequential circuits and timing in digital circuits. Clock distribution. Memory design. Input/Output circuits, power distribution network on Integrated Circuit. Design automation methodologies. CAD Tools. CMOS design, static and dynamic CMOS logic structures. Integrated Circuit Floorplan and layout. VLSI simulation and verification. Laboratory exercises on circuit modeling, design and simulation at transistor level.
Expected	Upon successful completion of this course, students will be able to

learning outcomes and competences to be acquired	demonstrate knowledge and understanding of: • the VLSI design flow from the schematic up to fabrication on silicon. • the mathematical models of CMOS circuits simulation and analysis. • the CMOS design at transistor level. • the IC Design Rules and design rule checking. • the layout and floorplaning. • the usage of EDA/CAD tools for VLSI design, floorplan and mask preparation for fabrication. • the implementation tradeoffs and the selection of the best choices (performance,cost,energy consumption) according to the design requirements. • the various optimizations realized on a transistor level. • the common pitfalls of CMOS design. • the design of regular VLSI structures (adders, multiplicators, ROMS, PLAs, SRAMs). • the clock skew and the noise problems and how to avoid it on a design.
Prerequisites	Knowledge from the following courses is required: • Digital Design, • Electronics I, II
Teaching methods	Lectures, lab exercises.
Assessment methods	Written exam (50%), lab exam (50%).
Language of instruction	Greek
Recommended bibliography	[1] *CMOS Digital Integrated Circuits: Analysis and Design*, KANG; LEBLEBICI, Εκδόσεις Επίκεντρο, 2014. [2] *Σχεδιασμός Ψηφιακών Συστημάτων σε FPGAs*, Wayne Wolf, ΕΚΔΟΣΕΙΣ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ, 2013. [3] *ΨΗΦΙΑΚΑ ΟΛΟΚΛΗΡΩΜΕΝΑ ΚΥΚΛΩΜΑΤΑ: ΜΙΑ ΣΧΕΔΙΑΣΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ*, JAN M. RABAEY, ANANTHA CHANDRAKASAN, BORIVOJE NIKOLIC, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ, 2006.

Course title	**Electric Machines**
Course code	E31
Course type	Elective

Course level	Undergraduate (first cycle)
Year of studies	4th
Semester	8th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH170/
Hours per week	4
Instructor(s)	Theodoros Theodoulidis (Professor)
Course content	Basic principles of electromagnetism and ac and dc electric machines. Equivalent circuits. dc motors. Three phase and single-phase induction motors. Synchronous motors. Load curves (torque-speed). Speed control, starting and motor selection.
Expected learning outcomes and competences to be acquired	The student is introduced to the basic principles of electrical machinery. Learns to analyze the basic types of electric motors in order to obtain information about their efficiency and load curves. Can also study driver systems depending on the required application/setup. In the lab he/she assimilates better the basic configurations and obtains real experience.
Prerequisites	Electric Circuits
Teaching methods	Hours of Instruction 52 (Theory: 40, Laboratory: 12)
Assessment methods	Final written exam (compulsory) , Laboratory assignments (compulsory)
Language of instruction	Greek
Recommended bibliography	[1] Electric Machines, S. Chapman, 4th edition, Tziolas Editions, 2009. [2] Electric Machines, C. Hubert, ION Editions, 2008.

Course title	**Electromechanical Applications**
Course code	E32
Course type	Elective
Course level	Undergraduate (first cycle)
Year of studies	4th

Semester	8th
ECTS Credits	5
URL	http://eclass.uowm.gr/courses/MECH171/
Hours per week	4
Instructor(s)	Theodoros Theodoulidis (Professor)
Course content	Electromechanical installations: electrical installations of buildings. Electromechanical applications: nondestructive testing of materials and structures. Electric generators and transformers. Power systems. Power systems.
Expected learning outcomes and competences to be acquired	Introduction to the studies of electromechanical installations and study of applications where a synthesis of knowledge and tools of Electrical and Mechanical Engineer are required. Based on the laboratory exercises, the student acquires knowledge and capabilities in performing real Non Destructive Inspections by using at least three methods.
Prerequisites	Electric Circuits
Teaching methods	Hours of Instruction 52 (Theory: 39, Laboratory: 13)
Assessment methods	One electric installation study (compulsory) , Laboratory assignments (compulsory)
Language of instruction	Greek
Recommended bibliography	[1] Electric installations of buildings, S. Touloglou, ION Editions, 2004. [2] Electric installations of consumers, P. Ntokopoulos, Zisis Editions, 2005.

DIPLOMA-THESIS WRITING REGULATION

The Disploma Thesis (DT) is written by all students in the final year of their studies. The successful accomplishment of the DT, under the supervision of TRS (Teaching and Research Staff) members of the department, consists an essential, substantial and formal requirement for obtaining the diploma of Informatics and Telecommunications Engineering of the University of Western Macedonia. Each DT is drafted individually.

Undertaking a DT

Students have the right to undertake a DT after completing the first 8 semesters of their studies and if the number of courses they haven`t completed does not exceed nine. In this number the lessons of the 9th semester are not calculated.

Purpose of DT

The DT enables students to demonstrate their skills in concluding independent topics of Engineering Informatics and Telecommunications Science. In addition, it represents an opportunity to practice and enrich their knowledge in Computer Science and Telecommunications, as well as their advanced applications. Through DT, students acquire and cultivate additional skills that will be brought into play in their future professional path. DT can combine some of the following characteristics:

- Research profile that may lead to new results, which are considered worthy of publication in scientific conferences and journals.
- Exploring new technologies and participation in development projects.
- Interdepartmental projects developed in collaboration with TRS) members of other departments.

Selection criteria

The supervising professors can use the following criteria before assigning a DT:

- The Grades of the courses related to the content of the DT.
- Average Grade.

In addition, supervisors have the right to refuse the assignment of a DT.

Dissertation examination and marking

The Dissertation is examined by the supervising professor and an additional co-examiner. The average mark of two examiners results in the final score of the Dissertation.

Dissertation presentation

The candidate graduates make a public presentation of their DTs during a day conference organized by the Department.

Process of DT Assignment

The assignment procedure is done during the course registration period. Students who undertake a DT have to submit to the Administration Office its title and the name of their supervising professor.

Each TRS member may announce Dissertations for at least two (2) and at most four (4) students.

If all TRS members have assigned the maximum number of DT and there are still students who have not undertaken an assignment while they wish to and they meet all the criteria, then the General Assembly of the Department may approve additional assignments over the maximum predicted number per TRS member.

For each DT a supervisor Professor is assigned and, if necessary, a co-supervisor, who may be a Laboratory Teaching Staff member or a member of the Teaching Staff of the Department in accordance with Presidential Decree 407/80.

The successfully completed DTs, are submitted to the Administration Office on announced dates.

TRANSITIONAL PROVISIONS

2012-2013

1. The required number of courses for obtaining the diploma remains as it was specified in the year of admission of each student.

Academic Year of Admission	Courses for Degree
2012-2013	56
2011-2012	57
2010-2011	57
2009-2010	58
2008-2009	58
2007-2008	58
2006-2007	58
2005-2006	57

2. To obtain a diploma, you must successfully pass a minimum of 48 core and at least six elective courses. The courses in which the students have been successfully examined as mandatory academic direction courses are also considered mandatory.
3. For a student to advance to the 7th semester of his studies, he must have successfully passed a minimum of 20 courses of the first 6 semesters.
4. Students who in previous years have not successfully passed exams in the course **Physics 2 (Electromagnetism)**, must resit successfully the exam in the course of the new syllabus **Physics**.
5. Students who in previous years have not successfully passed exams in the course **Digital Design I**, must resit successfully the exam in the course of the new syllabus **Digital Design**.
6. The course, **Introduction to Economic Theory** has been renamed to **Technology, Innovation, Economics and Entrepreneurship**. So, students who have successfully passed the first , will not be examined in the second course .
7. Students who in previous years have successfully passed exams in the course **Parallel Processing Systems**, will not need to resit exams in the new course **Parallel and Distributed Processing Systems**.
8. Students who have successfully passed exams in elective courses which have been later deemed compulsory, these courses will be considered compulsory.

9. Students who have failed to pass courses which were deemed compulsory, but are no longer offered as compulsory (or not offered at all, or offered as electives) must complete the required number of compulsory courses only out of those courses offered as compulsory in the new study guide.
10. In the 7th, 8th and 9th semester, each student must have successfully passed exams of a minimum two compulsory courses of these semesters.
11. If a student fails to pass courses which a) at initial registration, belonged to the first 6 semesters (compulsory) and b) in the syllabus of 2012-13 (and of subsequent years) are still offered in the first 6 semesters, it is a prerequisite that he passes them successfully .

2014-2015

1. The compulsory course **Embedded Systems** of the 9th semester will be offered hereinafter as an elective.

   Students who enrolled during the academic years 2005-2006, 2006-2007, 2007-2008, 2008-2009, 2009-2010 and 2010-2011 and have failed to pass this compulsory course, they have to pass it successfully. It will be offered as an elective, but will be deemed to them as compulsory. (The transitional provisions of the academic year 2012-2013 are not canceled, through which students must successfully pass exams in at least two compulsory courses in each of the 7th, 8th and 9th semesters).
2. The elective course **Computer and Network Security** becomes compulsory in the 8th semester.

   Students who have passed the course **Computer and Network Security** as an elective, it will count as an elective.
3. The course **Special Assignment** will be introduced as a fall semester elective course.
4. The course **Dynamics** (elective of the spring semester) will no longer be offered.
5. New elective courses will be introduced: **Embedded Systems, VLSI Design, Microprocessors, Advanced Digital Design Issues, Mobile Computing, Compilers, Network Design, Electric Power Systems, Electrical Machines, Thermodynamics, Electromechanical Applications**.
6. The course **Physics** of the 1st semester will be renamed to **Electromagnetism**. The course **Electromagnetic Field Theory** of the 5th semester is renamed to **Electromagnetic Waves**. The content of these courses does not change.